

APPENDIX E
BIOLOGICAL RESOURCES TECHNICAL REPORT



Biological Resources Technical Report

North Houston Highway Improvement Project

From US 59/I-69 at Spur 527 to I-45 at Beltway 8 North

CSJ 0912-00-146

Prepared by: TxDOT Houston District

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Executive Summary

An identification of biological resources was conducted for the North Houston Highway Improvement Project in Harris County, Texas. This identification included a review of vegetation, wildlife, and threatened and endangered species, and consideration of the need to coordinate with the Texas Parks and Wildlife Department (TPWD). The proposed project begins at the interchange of Interstate Highway 45 (I-45) and Beltway 8 North and continues south along I-45 to Downtown Houston where it terminates at the interchange of United States Highway (US) 59/I-69 and Spur 527 south of Downtown Houston. The project area also includes portions of I-10 and US 59/I-69 near Downtown Houston. The proposed project is composed of three segments, Segments 1-3, for which reasonable alternatives are evaluated in the Draft Environmental Impact Statement (DEIS) (*Exhibit 1*).

Existing Facilities

Segment 1: I-45 from Beltway 8 North to north of I-610 (North Loop)

I-45 within this segment consists of eight general purpose lanes (i.e., mainlanes; four lanes in each direction), four frontage road lanes (two lanes in each direction), and a reversible high occupancy vehicle (HOV) lane in the middle, all within a variable right-of-way (ROW) of 250 to 300 feet. The existing posted speed limit along the general purpose lanes and reversible HOV lane is 60 miles per hour (mph). The existing posted speed limit for the frontage roads is 45 mph. The length of Segment 1 is approximately 8.8 miles, and the area of the existing ROW is approximately 347 acres.

Segment 2: I-45 from north of I-610 (North Loop) to I-10

I-45 within this segment primarily consists of eight at-grade general purpose lanes (four lanes in each direction), six frontage road lanes (three lanes in each direction), and a reversible HOV lane in the middle, all within a variable ROW of 300 to 325 feet. Segment 2 also includes a depressed section that consists of eight general purpose lanes (four lanes in each direction) and a reversible HOV lane in the middle, all below grade, within a 245-foot ROW. The six frontage road lanes associated with the depressed section (three lanes in each direction) are located at-grade. The existing posted speed limit is 60 mph along the general purpose lanes, 55 mph along the reversible HOV lane, and 40 mph along the frontage road lanes. The I-45 and I-610 frontage roads are discontinuous at the I-45/I-610 interchange. The length of Segment 2 is approximately 4.5 miles, and the area of the existing ROW is approximately 220 acres.

Segment 3: Downtown Loop System (I-45, US 59/I-69, and I-10)

The Downtown Loop System consists of three interstate highways that create a loop around Downtown Houston. I-45 forms the western and southern boundaries of the loop and is known locally as the Pierce Elevated because it partially follows the alignment of Pierce Street. I-10 forms the northern boundary of the loop, and US 59/I-69 forms the eastern boundary of the loop. The loop includes three major interchanges: I-45 and I-10, I-10 and US 59/I-69, and US 59/I-69 and I-45. The interchange of US 59/I-69 and Spur 527 is located south of Downtown Houston.

I-45 along the west side of Downtown Houston consists of six elevated general purpose lanes (three lanes in each direction) within an existing ROW of 205 feet. I-45 along the south side of Downtown Houston (the

Pierce Elevated) consists of six elevated general purpose lanes (three lanes in each direction). I-10 north of Downtown Houston, between I-45 and US 59/I-69, consists of 10 general purpose lanes (five lanes in each direction) within an existing ROW of 420 feet. US 59/I-69 along the east side of Downtown Houston consists of six general purpose lanes (three lanes in each direction) within an existing ROW of 225 feet. Generally, local streets serve as one-way frontage roads within Segment 3, except near the I-10 and US 59/I-69 interchange, where the frontage roads are discontinuous. The length of Segment 3, which includes the Downtown Loop System, is approximately 7.1 miles, and the existing ROW area is approximately 637 acres.

Proposed Alternatives

Segment 1: I-45 from Beltway 8 North to north of I-610 (North Loop)

Segment 1, Alternative 4: Widen I-45 Mostly to the West (Proposed Recommended)

Alternative 4 would widen the existing I-45 on the west side of the roadway to accommodate four managed express (MaX) lanes. The proposed typical section would include eight general purpose lanes (four lanes in each direction), four MaX lanes (two lanes in each direction), and six frontage road lanes (three lanes in each direction), all at-grade. Alternative 4 would require approximately 200 to 225 feet of new ROW to the west of the existing I-45. This alternative would require small amounts of land to the east of the existing I-45 ROW at major intersections and between Crosstimbers Street and I-610. Approximately 212 acres of new ROW would be required for this alternative. The length of this alternative would be approximately 8.8 miles.

Segment 1, Alternative 5: Widen I-45 Mostly to the East

Alternative 5 would widen the existing I-45 along the east side of the roadway to accommodate four MaX lanes. The proposed typical section would include eight general purpose lanes (four lanes in each direction), four MaX lanes (two lanes in each direction), and six frontage road lanes (three lanes in each direction), all at-grade. Alternative 5 would require approximately 200 to 225 feet of new ROW to the east of the existing I-45. This alternative would require small amounts of land to the west of the existing I-45 ROW at major intersections. Approximately 239 acres of new ROW would be required for this alternative. The length of this alternative would be approximately 8.8 miles.

Segment 1, Alternative 7: Widen I-45 on Both Sides

Alternative 7 would widen the existing I-45 along both the east and west sides of the roadway to accommodate four elevated MaX lanes. The proposed typical section would include eight general purpose lanes (four lanes in each direction) at-grade, four elevated MaX lanes (two lanes in each direction) on a single structure constructed along the center of the roadway, and six frontage road lanes (three lanes in each direction) at-grade. Alternative 7 would require approximately 45 to 80 feet of new ROW along both sides of the existing I-45. Approximately 120 acres of new ROW would be required for this alternative. The length of this alternative would be approximately 8.8 miles.

Segment 2: I-45 from north of I-610 (North Loop) to I-10 (including the interchange with I-610)

Segment 2, Alternative 10: Add Four MaX Lanes to I-45 (Proposed Recommended)

Alternative 10 would widen the existing I-45 to accommodate four MaX lanes. Within the at-grade section of I-45, the proposed typical section would include eight general purpose lanes (four lanes in each direction), four MaX lanes (two lanes in each direction), and four frontage road lanes (two lanes in each direction), all at-grade. For this alternative, I-45 would be depressed from north of Cottage Street to Norma Street, a distance of approximately 1,800 feet. Within the depressed section of I-45, the proposed typical section would include eight below-grade general purpose lanes (four lanes in each direction), and four below-grade MaX lanes (two lanes in each direction), while the four frontage road lanes (two lanes in each direction)

would be at-grade. The proposed I-45 and I-610 frontage roads would be continuous through the I-45/I-610 interchange. Alternative 10 would require new ROW for the at-grade section between I-610 and Cottage Street, and between Little White Oak Bayou and Norma Street. Approximately 19 acres of new ROW would be required for this alternative. The length of this alternative, including interchange improvements, would be approximately 4.5 miles.

This alternative provides an opportunity to include a structural “cap” over a portion of the depressed lanes of I-45 from north of Cottage Street to south of N. Main Street. This area could be used as open space. The open space option is conceptual only and would be separate from the Texas Department of Transportation’s (TxDOT’s) roadway project. Any open space would require development and funding by parties other than TxDOT.

Segment 2, Alternative 11: Add Four Elevated MaX Lanes in the Center of I-45

Alternative 11 would widen the existing I-45 and add four elevated MaX lanes. Within the at-grade section of I-45, the proposed typical section would include eight general purpose lanes (four lanes in each direction) and four frontage road lanes (two lanes in each direction), all at-grade, while the four MaX lanes (two lanes in each direction) would be elevated on a single structure at the center of the roadway. Within the depressed section of I-45, the proposed typical section would include eight general purpose lanes (four lanes in each direction) below grade, four MaX lanes (two lanes in each direction) elevated on a single structure at the center of the roadway, and four frontage road lanes (two lanes in each direction) at-grade. The proposed I-45 and I-610 frontage roads would be continuous through the I-45/I-610 interchange. New ROW would be required for the at-grade section between I-610 and Cavalcade Street to accommodate the proposed improvements at the I-45/I-610 interchange. No new ROW would be required for the depressed section. Approximately 10 acres of new ROW would be required for this alternative. The length of this alternative, including interchange improvements, would be approximately 4.5 miles.

Segment 2, Alternative 12: Add Four MaX Lanes (Two Elevated) in the Center of I-45

Alternative 12 would widen the existing I-45 and add two elevated and two at-grade MaX lanes. Within the at grade section of I-45, the proposed typical section would include eight general purpose lanes (four lanes in each direction) and four frontage road lanes (two lanes in each direction), all at grade, while the four MaX lanes (two lanes in each direction) would be stacked (the two northbound MaX lanes would be at-grade and the two southbound MaX lanes would be elevated on a single structure along the center of the roadway). Within the depressed section of I-45, the proposed typical section would include eight general purpose lanes (four lanes in each direction) below grade, four MaX lanes (two lanes in each direction) that would be stacked (the two northbound MaX lanes would be below grade and the two southbound MaX lanes would be elevated on a single structure along the center of the roadway), and four frontage road lanes (two lanes in each direction) that would be at-grade. The proposed I-45 and I-610 frontage roads would be continuous through the I-45/I-610 interchange. New ROW would be required for the at-grade section between I-610 and Cavalcade Street to accommodate the proposed improvements at the I-45/I-610 interchange. No new ROW would be required for the depressed section. Approximately 12 acres of new ROW would be required for this alternative. The length of this alternative, including interchange improvements, would be approximately 4.5 miles.

Segment 3: Downtown Loop System (I-45, US 59/I-69, and I-10)

Segment 3, Alternative 10: Widen I-45 to 10 Lanes

Alternative 10 is an “improve existing” alternative, with the existing interstate highways around Downtown Houston remaining in their current configuration. Alternative 10 would widen the existing I-45 within its

existing footprint along the west and south sides of Downtown Houston. The elevated portion of I-45 west and south of Downtown would be reconstructed. The proposed typical section of the widened I-45 would include 10 elevated general purpose lanes; however, the lane configuration would be altered to have six northbound lanes and four southbound lanes. The I-45 MaX lanes proposed in Segments 1 and 2 would terminate in the Downtown area in Segment 3. The I-45 MaX lanes would be parallel to I-10 in the vicinity of the I-45/I-10 interchange and would terminate/begin at Milam Street/Travis Street, respectively. I-10 along the north side of Downtown, between I-45 and US 59/I-69, would be slightly realigned to accommodate four elevated I-10 express lanes (two lanes in each direction) on this segment of I-10. The I-10 express lanes would generally be parallel to I-10, and located on the north side of White Oak Bayou. West of the I-45/I-10 interchange, the I-10 express lanes would connect to the existing I-10 HOV lanes. US 59/I-69 along the east side of Downtown would generally remain in its current configuration. Alternative 10 would require new ROW along I-45 from I-10 to Houston Avenue and from Brazos Street to US 59/I-69. Alternative 10 would require approximately 76 acres of new ROW. The length of this alternative, including interchange improvements, would be approximately 4.4 miles.

Segment 3, Alternative 11: Realign I-45 along I-10 and US 59/I-69 (Proposed Recommended)

Alternative 11 would reroute I-45 to be coincident with US 59/I-69 on the east side of Downtown Houston. The existing elevated I-45 roadway along the west and south sides of Downtown would be removed and relocated to be parallel to I-10 on the north side of Downtown and parallel to US 59/I-69 on the east side of Downtown. Access to the west side of Downtown would be provided via “Downtown Connectors,” which would provide access to and from various Downtown streets. To improve safety and traffic flow in the north and east portions of the proposed project area, both I-10 and US 59/I-69 would be realigned to eliminate the current roadway curvature. I-45 and US 59/I-69 would be depressed along a portion of the alignment east of Downtown. South of the George R. Brown Convention Center, I-45 would begin to elevate to the interchange of I-45 and US 59/I-69 southeast of Downtown, while US 59/I-69 would remain depressed as it continues southwest toward Spur 527. The four proposed I-45 MaX lanes in Segments 1 and 2 would terminate/begin in Segment 3 at Milam Street/Travis Street, respectively. I-10 express lanes (two lanes in each direction) would be located generally in the center of the general purpose lanes within the proposed coincidental alignment of I-10 and I-45 on the north side of Downtown. The I-10 express lanes would vary between being elevated and at-grade. Approximately 190 feet of new ROW to the east of the existing US 59/I-69 along the east side of Downtown would be required to accommodate the proposed realigned I-45. The existing Hamilton Street would be realigned to be adjacent to US 59/I-69 to serve as the southbound frontage road, and the existing St. Emanuel Street would serve as the northbound frontage road. Alternative 11 would require approximately 160 acres of new ROW, the majority of which would be for the I-10 and US 59/I-69 realignments, and to construct the proposed I-45 lanes adjacent to US 59/I-69 along the east side of Downtown. The length of this alternative, including roadway realignments and interchange improvements, would be approximately 12.0 miles.

This alternative provides an opportunity to include a structural “cap” over the proposed depressed lanes of I-45 and US 59/I-69 from approximately Commerce Street to Lamar Street. This area could be used as open space. The open space option is conceptual only and would be separate from TxDOT’s roadway project. Any open space project would require development and funding by parties other than TxDOT.

Segment 3, Alternative 12: Realign Northbound I-45 along US 59/I-69 and I-10

Alternative 12 would reroute northbound I-45 to be coincident with US 59/I-69 on the east side of Downtown Houston. An elevated structure would be constructed to accommodate four I-45 northbound general purpose lanes that would be located east of the existing US 59/I-69 general purpose lanes. Northbound I-45 traffic would continue on elevated lanes constructed between the I-10 general purpose lanes, then would

move northward into Segment 2. Southbound I-45 traffic at the I-45/I-10 interchange northwest of Downtown would be directed onto one-way general purpose lanes along the west and south sides of Downtown, following the existing Pierce Elevated footprint. The four proposed I-45 MaX lanes in Segments 1 and 2 would terminate/begin in Segment 3 at Milam Street/Travis Street, respectively. I-10 express lanes (two lanes in each direction) are proposed to be located along the portion of the existing I-10 north of Downtown between the interchanges of I-10 and I-45, and I-10 and US 59/I-69. Near the US 59/I-69 interchange, the I-10 express lanes would be located at-grade in the center of the general purpose lanes, then would shift to become elevated and generally parallel to I-10, but located on the north side of White Oak Bayou. West of the I-45/I-10 interchange, the I-10 express lanes would connect to the existing I-10 HOV lanes. US 59/I-69 along the east side of Downtown would generally remain in its current configuration, with the I-45 one-way northbound lanes being immediately adjacent to this segment of US 59/I-69. Alternative 12 would require approximately 109 acres of new ROW. The length of this alternative, including interchange improvements, would be approximately 9.8 miles.

Vegetation

According to the Ecoregions of Texas, the project area is situated within the Western Gulf Coastal Plain Ecoregion of Texas. This ecoregion is characterized by relatively flat topography and primarily grassland as its potential natural vegetation (Griffith et al. 2007). The entire project area is located within highly urbanized areas of Houston, Texas.

Specifically, the project area is located in the Northern Humid Gulf Coastal Prairies area of the Western Gulf Coastal Plain Ecoregion, which is characterized by low relief and generally poor drainage. Historically, the Northern Humid Gulf Coastal Prairies were mostly tallgrass grasslands with scattered oak mottes and maritime woodlands. Dominant grass species were little bluestem (*Schizachyrium scoparium*), yellow Indiangrass (*Sorghastrum nutans*), brownseed paspalum (*Paspalum plicatulum*), gulf muhly (*Muhlenbergia capillaris*), and switchgrass (*Panicum virgatum*) that have mixed with hundreds of other herbaceous species. Pecan (*Carya illinoensis*), sugarberry (*Celtis laevigata*), ash (*Fraxinus* sp.), southern live oak (*Quercus virginiana*), and cedar elm (*Ulmus crassifolia*) are important riparian overstory species. Annual precipitation varies from 37 to 58 inches. Soil textures vary, but tend to be fine-textured with clay, clay loam, or sandy clay loam. The area has a long history of alteration, including the historical use of fire, domestic cattle grazing, agriculture, and, more recently, urban development. Almost all of the coastal prairies have been converted to cropland, rangeland, pasture, or urban and industrial land uses. Additionally, drainage and irrigation canals have been constructed, and stream channelization has occurred in many areas.

The existing I-45 ROW is approximately 90 percent concrete pavement and comprises over 65 percent of the project area. The remainder of the project area is highly developed with landscaped ornamental plant communities within residential, commercial, and industrial areas. Ornamental plantings of woody species include crepe myrtle (*Lagerstroemia indica*), loblolly pine (*Pinus taeda*), and other species of trees, shrubs, and bushes. Bermuda grass (*Cynodon dactylon*) and Saint Augustine grass (*Stenotaphrum secundatum*) are the most common herbaceous plants within landscaped areas. Vegetation in the project area along existing roadway ROW is generally comprised of herbaceous species that are routinely maintained by mowing. The majority of the riparian areas are maintained by mowing. A small portion of Woodland Park, composed of mostly deciduous trees and dense understory, is located within the project area. Buffalo Bayou in the western portion of the project area has been landscaped with trees, shrubs, and herbaceous species that are maintained by mowing. Buffalo Bayou in the eastern portion of the project area exhibits channel banks that are overgrown with volunteer vegetation such as sycamore (*Platanus occidentalis*), red mulberry (*Morus*

rubra), river birch (*Betula nigra*), sugarberry, black willow (*Salix nigra*), mimosa (*Albizia julibrissin*), China-berry tree (*Melia azedarach*), and giant reed (*Arundo donax*).

Vegetation Impacts

Review of TPWD's Ecological Mapping Systems of Texas (EMST) data, revealed that over 98 percent of the project area is mapped as urban, with less than 1 percent mapped as disturbed prairie and less than 0.5 percent mapped as agriculture or riparian. Limited field investigations were conducted and indicate that over 99 percent of the project area exhibits urban characteristics with less than 0.4 percent having riparian or open water characteristics. Vegetation within the project area is primarily ornamental plantings in the ROW, residential, commercial, and industrial areas that are routinely mowed and maintained. Construction of any of the project alternatives would impact herbaceous, shrub, tree, and other plantings through site preparation activities. Clearing and grading would remove existing vegetative cover and replace it with mostly impervious cover associated with travel lanes, entrance and exit ramps, and frontage roads. Open areas occurring within the expanded project ROW would likely be planted with herbaceous vegetation that would be routinely maintained by mowing.

Review of the project alternatives indicates that a small portion of Woodland Park, approximately 212 square feet, would be impacted by construction of Alternatives 11 and 12. The overgrown banks of Buffalo Bayou in the eastern portion of the project area may be impacted by bridge construction, and possibly by shading resulting from the newly constructed bridges. However, removal of some bridges may partially offset the shading from some of the newly constructed bridges. Vegetation along Buffalo Bayou in the western portion of the project area, and along other water courses in the project area, is typically routinely maintained and may be impacted by bridge construction and possibly by shading resulting from the newly constructed bridges that are proposed to be located at the same locations as the existing bridges over Buffalo Bayou, which may reduce possible additional shading impacts.

Wildlife

Native wildlife populations within central Harris County have been largely displaced by the development and urbanization of Houston, leaving remaining habitat areas highly fragmented. The majority of riparian and upland woody vegetation, which provides cover for wildlife, has been removed. However, a number of wildlife species have adapted to the urbanized conditions; therefore, the developed urban conditions provide habitat for many wildlife species throughout the project area.

Birds that use open habitats in the region include the northern mockingbird (*Mimus polyglottos*), red-winged blackbird (*Agelaius phoeniceus*), scissor-tailed flycatcher (*Tyrannus forficatus*), mourning dove (*Zenaidura macroura*), and chipping sparrow (*Spizella passerina*). Birds commonly found within urban and residential areas include the northern cardinal (*Cardinalis cardinalis*), common grackle (*Quiscalus quiscula*), northern mockingbird, European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), and blue jay (*Cyanocitta cristata*). Riparian habitat adjacent to water courses and drainages provides cover, foraging, and perching habitat for many species of birds, including neo-tropical migrants. The open water of drainage ditches and bayous provides limited habitat for waterfowl and wading birds.

Mammal species adapted to living in urban and fragmented habitats are likely to occur within the project area. These species include Virginia opossum (*Didelphis virginiana*), black rat (*Rattus rattus*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), and gray squirrel (*Sciurus carolinensis*). Because of the lack of suitable cover, the presence of large mammals is limited within the project area. However, transient

observations of nutria (*Myocastor coypus*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), and skunk (*Mephitis mephitis*) might occur within the project area.

Southeast Texas has a diverse assemblage of reptiles and amphibians. Turtles and lizards that could be present within the residential, riparian, and open water areas include the red-eared slider (*Trachemys scripta elegans*), snapping turtle (*Chelydra serpentina*), Mediterranean house gecko (*Hemidactylus turcicus*), green anole (*Anolis carolinensis*), and five-lined skinks (*Eumeces fasciatus*). The eastern garter snake (*Thamnophis sirtalis sirtalis*), western cottonmouth (*Agkistrodon piscivorous leucostama*), Texas rat snake (*Elaphe obsoleta lindheimerii*), and diamondback water snake (*Nerodia rhombifer*) are common snakes that might occur in the project area as well. Amphibians that could be found in the project area include the southern leopard frog (*Rana utricularia*), bullfrog (*Rana catesbeiana*), and cricket frog (*Acris crepitans blanchardi*).

Wildlife Impacts

Wildlife occurring within the project area has adapted to the existing urban developed conditions. Construction of any of the project alternatives would potentially impact wildlife in the project area through the removal of vegetation and structures that provide habitat for wildlife. Mobile species would be expected to leave the project area as construction activities are initiated. Less mobile species or species sheltering in vegetation or structures within the project area could be injured or killed by demolition activities, movements of heavy construction equipment, or debris removal. The conversion of existing developed and landscaped conditions to roadway ROW would cause a loss of habitat, and could possibly cause further fragmentation of remaining habitat areas. Operation of any of the alternatives would potentially result in adverse impacts to wildlife from vehicle strikes because of the additional travel lanes. Increased impervious cover associated with the proposed project may introduce additional roadway pollutants to which wildlife could be directly exposed or that might degrade the quality of habitat adjacent to the project area. Wildlife remaining in areas immediately adjacent to the project area would be expected to adapt to the changed conditions (e.g., increased traffic movements and noise levels).

TxDOT/TPWD MOU and TPWD Coordination

The purpose of the Memorandum of Understanding (MOU) between TxDOT and TPWD is to provide a formal mechanism by which TPWD may review TxDOT transportation projects, including projects that have the potential to affect natural resources within areas owned or managed by TPWD. Upon completion of a preliminary review, a copy of environmental documentation is furnished to TPWD for all projects meeting the criteria for coordination. Coordination with TPWD for the proposed North Houston Highway Improvement Project is based on the following criteria within the MOU.

- The U.S. Fish and Wildlife Service's (USFWS) Information Planning and Conservation (IPaC) System website lists 3 birds (with conditional statements), 1 plant, and 1 marine mammal as threatened and endangered species potentially occurring in the project area. The website indicated that there is no designated critical habitat within the project area (USFWS 2016a). Least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), and red knot (*Calidris canutus rufa*) are listed conditionally and would only be considered for adverse effects if the project is related to wind-energy generation. The proposed North Houston Highway Improvement Project is not wind-energy related. Texas prairie dawn-flower (*Hymenoxys texana*) and the West Indian manatee (*Trichechus manatus*), are discussed further in the Threatened and Endangered Species section below. The proposed project would not affect the listed federally-protected species and/or habitat suitable for supporting the listed species. The IPaC website also listed 34 bird species that may occur within the project area that are protected by the Migratory Bird Treaty Act

(MBTA) and the Bald and Golden Eagle Protection Act. Fifteen (15) of the 34 bird species are year-round or breeding residents. The remaining bird species over-winter or migrate through the general vicinity of the project area. Best management practices (BMPs) would be incorporated into the construction, operation, and maintenance of the proposed project to protect migratory birds and their nests. There is no potential for the proposed project to impact bald or golden eagles.

- The National Oceanic and Atmospheric Administration (NOAA) Essential Fish Habitat (EFH) Mapper was reviewed for the presence of EFH in the proposed project area. Although tidal waters are present in Harris County, the EFH mapper indicated that the project area does not contain EFH (NOAA 2016).
- Review of the USFWS Coastal Barrier Resources Act (CBRA) Mapper indicated that the project area is not within a designated CBRA area (USFWS 2016b).
- Review of the Florida Manatee Recovery Plan (USFWS 2001), indicates that West Indian manatees on rare occasions are found along the Texas coast during summer months. According to the USFWS IPaC, manatees are the only marine mammal that have a potential to be found in the project area. However, it is unlikely that the manatee would be found within the portions of Buffalo Bayou or White Oak Bayou that are within the project area as there is a lack of adequate manatee habitat (i.e., food resources such as sea grasses). Manatees are protected under the Endangered Species Act and the Marine Mammal Protection Act.
- Review of the project alternatives indicates that the proposed project may impact waters of the United States, and that coordination under the Fish and Wildlife Coordination Act would be required. Impacts to waters of the United States from construction of the proposed project would likely be authorized by either a Department of the Army nationwide or individual permit, depending on final design. Smaller drainage ditches and bayous may be impacted by extending culverts, and larger drainage ditches and bayous would likely be bridged.
- BMPs would be incorporated into the construction, operation, and maintenance of the proposed project to control invasive species. The project would also include beneficial landscaping to be in compliance with Executive Order 12112 on Invasive Species.
- The project area is located in a highly urbanized area where there is no prime, unique, state-wide important or locally important farmland.

Currently, the North Houston Highway Improvement Project is in the planning stages, with only preliminary design for the project alternatives. Adverse impacts to riparian and aquatic habitats are anticipated to be minimal, as most, if not all, of the larger streams and bayous are expected to be bridged. However, an accurate assessment of possible impacts to aquatic resources associated with water bodies within the project footprint will not be known until final design. Following final design, TxDOT will assess potential construction impacts to habitats and sensitive species. The identified impacts could prompt the need to coordinate with TPWD, or the implementation of additional BMPs.

TPWD coordination is required for species designated as Species of Greatest Conservation Need (SGCN) for which BMPs have not been established in the programmatic agreements between TxDOT and TPWD. BMPs have been developed for many of the SGCN; however, no BMPs have been established for the listed SGCN plants and the southern crawfish frog. Because of the absence of BMPs for these SGCN, coordination with TPWD is required.

Threatened and Endangered Species

The Endangered Species Act of 1973 (ESA) assigns the responsibility of enforcement to the Secretary of the Interior and the USFWS. Chapters 68 and 88 of the TPWD code address TPWD's responsibilities regarding

state-listed threatened and endangered species. The proposed project area was evaluated using both the USFWS and TPWD lists of federally- and state-listed threatened and endangered species.

U.S. Fish and Wildlife Service

The purpose of the ESA is to protect threatened and endangered species and their critical habitat. Endangered is defined as a species that is in danger of extinction throughout all or a substantial portion of its range. Threatened is defined as a species that is likely to become endangered in the future throughout all or a substantial portion of its range. In addition to endangered and threatened species, the USFWS maintains a list of “candidate” species. According to the USFWS, candidate species are plants and animals for which the agency has sufficient information on the species’ biological status and threats to propose the species as endangered or threatened under the ESA, but for which development of a proposed listing regulation is precluded by other higher-priority listing activities. Section 4 of the ESA identifies five criteria for a species to be listed as threatened or endangered:

- The present or threatened destruction, modification, or curtailment of a species’ habitat or range;
- Overutilization for commercial, recreational, scientific, or educational purposes;
- Disease or predation;
- The inadequacy of existing regulatory mechanisms; or
- Other natural or manmade factors affecting the species’ continued existence.
- The USFWS IPaC website lists 3 birds (least tern, piping plover, and red knot), Texas prairie dawn-flower, and the West Indian manatee as either endangered or threatened (*Table 1*). There are no candidate species listed. However, the USFWS website county-by-county listing shows only 3 species that may occur within Harris County, Texas: the bald eagle, listed as recovered; Texas prairie dawn-flower, and West Indian manatee, both listed as endangered (USFWS 2016a).

Table 1: Federally-Listed Threatened or Endangered Species

	Common Name	Scientific Name	Status	Habitat Description	Habitat Potential	Effect
Birds	Least tern*	<i>Sterna antillarum</i>	Endangered	Interior subspecies, which is listed as endangered and found inland, (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also known to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc.); eats small fish and crustaceans; when breeding forages within a few hundred feet of colony	No	No
	Piping plover*	<i>Charadrius melodus</i>	Threatened	Beaches and bayside mud or salt flats	No	No
	Red knot*	<i>Calidris canutus rufa</i>	Threatened	Tidal flats and beaches, herbaceous wetlands	No	No

Plant	Texas Prairie Dawn-flower	Hymenoxys texana	Endangered	Poorly drained areas in open grasslands; pimple mounds	No	No
Mammal	West Indian Manatee	Trichechus manatus	Endangered	Gulf and bay system	No	No

*Per USFWS IPaC website, these species only need to be considered for wind energy-related projects within their migratory route.

Least Tern

The least tern is federally listed as endangered within the project area because part of the project is more than 50 miles from the Gulf of Mexico coastline. The USFWS IPaC website states that the interior least tern is conditionally listed and should be considered only if the project is related to wind energy generation. The proposed project is a highway project; therefore, the interior least tern would not be considered in the review of the proposed project. There would be no effect to this species as a result of the proposed project.

The interior least tern includes only those least terns that breed and nest within the boundary of the continental U.S. on interior rivers and other water bodies. There are other breeding populations of least terns that are found along coastal and estuarine habitats in the U.S. from Texas to Maine, and along islands of the Gulf of Mexico, Atlantic Ocean, and Caribbean Sea. Coastal least terns are not included in the federal endangered species listing. Interior least terns generally nest on the ground, in open areas, and near appropriate feeding habitat. Vegetation-free sand or gravel islands are preferred for nesting, although sand banks, point bars, and beaches may also be used. Interior least terns prefer areas remote from trees or other vegetation that may hide or support predators, and will also nest on anthropogenic sites near water bodies with appropriate fish species and in sufficient abundance (Campbell 1995; TPWD 2015b). None of this type of habitat is present within the project area; therefore, there would be no effect to this species as a result of the proposed project.

Piping Plover

The piping plover is federally listed as threatened in the project area. The piping plover is a statewide migrant that winters along the Gulf Coast. Preferred wintering habitats include beaches, sandflats, mudflats, algal mats, and dunes along the Gulf Coast and adjacent offshore islands, and spoil islands in intracoastal waterways (Campbell 1995; USFWS 2009b). The piping plover is not expected to occur within the project area, because preferred wintering habitat is not present. The USFWS IPaC website states that the piping plover is conditionally listed and should be considered only if the project is related to wind energy generation. The proposed project is a highway project; therefore, the piping plover would not be considered in the review of the proposed project. There would be no effect to this species as a result of the proposed project.

Red Knot

The red knot is federally listed as threatened in the project area. In Texas, the red knot is a migrant each spring and fall and is known to over-winter along the Gulf Coast (USFWS 2014a). Red knot breeding grounds are in the north central Canadian Arctic. Red knots are known to over-winter as far south as the extreme south end of Tierra del Fuego. The red knot is a shorebird and is not expected to occur within the project area because of the lack of suitable habitat. The USFWS IPaC website states that the red knot is conditionally listed and should be considered only if the project is related to wind energy generation. The

proposed project is a highway project, therefore, the red knot would not be considered in the review of the proposed project. There would be no effect to this species as a result of the proposed project.

Texas Prairie Dawn-flower

The Texas prairie dawn-flower is listed as endangered by the USFWS. This species is endemic to Harris County and is found in poorly drained depressions. It prefers sparsely-vegetated areas at the base of mima mounds in open grasslands, or almost barren areas on slightly saline soils (Pool et al. 2007). The Texas prairie dawn-flower flowers from March to early April. This small, delicate annual, standing from 1 inch to 6 inches tall, expresses itself only between the months of January and April during some years but not others. It is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

West Indian Manatee

The West Indian manatee is listed as endangered by the USFWS. The manatee is a massive torpedo-shaped animal with skin that is uniformly dark grey, wrinkled, sparsely haired, and rubberlike (USFWS 2001). Adults average about 10 feet in length and 2,200 pounds in weight. Manatees live in freshwater, brackish, and marine habitats and their preferred food is submerged, emergent, and floating vegetation. During the winter, cold temperatures keep the manatees concentrated in peninsular Florida and many rely on warm water from natural springs and power plant outfalls. During the summer months, manatees have been known to range as far north as Rhode Island and as far west as Texas. There is no designated manatee critical habitat in Texas. The manatee is not expected to occur within the project area because of a lack of sufficient food resources within the water courses traversing the project area. The proposed project would have no effect on this species.

State- and Federally-Listed Threatened and Endangered Species and Species of Greatest Conservation Need

Table 2 is a combined list of state- and federally-listed threatened and endangered species for Harris County as compiled by TxDOT. Table 2 also includes state-listed SGCN. The table indicates whether habitat is present within the project area and whether there would be an effect/impact to any of the listed species from implementation of the proposed project.

Table 2: State and Federal Threatened and Endangered Species of Harris County

Common Name	Scientific Name	State Status	Federal Status	Habitat Description	Habitat Present	Effect/Impact
AMPHIBIANS						
Houston Toad	<i>Anaxyrus houstonensis</i>	E	E†	Sandy soil, breeds in ephemeral pools	No	No
Southern Crawfish Frog	<i>Lithobates areolatus areolatus</i>	SGCN		Abandoned crawfish holes and small mammal burrows. Found in moist meadows, pasturelands, pine scrub and river floodplains.	No	No
BIRDS						
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	T	D†	Potential migrant, nests in west Texas	No	No
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	SGCN	D†	Potential migrant	No	No
Bald Eagle	<i>Haliaeetus leucocephalus</i>	T	DΔ	Near water areas, in tall trees	No	No

Common Name	Scientific Name	State Status	Federal Status	Habitat Description	Habitat Present	Effect/Impact
Black Rail	<i>Laterallus jamaicensis</i>	SGCN	‡	Marshes, pond borders, wet meadows, and grassy swamps	No	No
Brown Pelican	<i>Pelecanus occidentalis</i>	SGCN	D†	Islands near coastal areas	No	No
Henslow Sparrow (wintering)	<i>Ammodramus henslowii</i>	SGCN		Weedy fields, fields with bunch grass, vines, and brambles, needs bare ground	No	No
Least Tern	<i>Sterna antillarum</i>	–	E	Least terns nest on barren to sparsely vegetated sandbars along rivers, sand and gravel pits, lake and reservoir shorelines	No	No
Mountain Plover	<i>Charadrius montanus</i>	SGCN		Short-grass plains and bare dirt (plowed fields)	No	No
Piping Plover	<i>Charadrius melodus</i>	T	T	Beach and bayside mud or salt flats	No	No
Red-cockaded Woodpecker	<i>Picoides borealis</i>	E	E†	Nests in 60+ year pine trees, forages in 30+ year pine stands	No	No
Red Knot	<i>Calidris camitus rufa</i>	SGCN	T	Tidal flats and beaches, herbaceous wetlands	No	No
Sprague's Pipit	<i>Anthus spragueii</i>	SGCN	*	Migrant, upland prairie, coastal grasslands	No	No
White-faced Ibis	<i>Plegadis chihi</i>	T	*	Freshwater marshes, but some brackish or salt marshes	No	No
White-tailed Hawk	<i>Buteo albicaudatus</i>	T	*	Coastal prairies	No	No
Whooping Crane	<i>Grus americana</i>	E	E†	Winters in Aransas National Wildlife Refuge	No	No
Wood Stork	<i>Mycteria americana</i>	T	*	Prairie ponds and flooded pastures	No	No
FISHES						
American Eel	<i>Anguilla rostrata</i>	SGCN		Coastal waterways below reservoirs to the gulf	Yes	No
Creek Chubsucker	<i>Erimyzon oblongus</i>	T	*	Variety of small rivers and creeks, prefers headwaters	Yes	No
Smalltooth Sawfish	<i>Pristis pectinata</i>	E	E†	Sheltered bays, shallow banks, estuaries and river mouths	No	No
MAMMALS						
Louisiana Black Bear	<i>Ursus americanus luteolus</i>	T	DM†	Bottomland hardwoods; large, undisturbed forested areas	No	No
Plains Spotted Skunk	<i>Spilogale putoria interrupta</i>	SGCN	*	Open fields, prairies, croplands, fence rows, farm yards, brushy areas, and tall-grass prairies	Yes	No
Rafinesque's Big-eared Bat	<i>Corynorhinus rafinesquii</i>	T	*	Cavity trees in hardwood forest, concrete culverts, abandoned buildings	Yes	Yes
Red Wolf	<i>Canis rufus</i>	E	E†	Extirpated, brushy, forested areas, coastal prairies	No	No

Common Name	Scientific Name	State Status	Federal Status	Habitat Description	Habitat Present	Effect/Impact
Southeastern Myotis Bat	<i>Myotis austroriparius</i>	SGCN		Cavity trees in hardwood forest, concrete culverts, abandoned buildings	Yes	Yes
West Indian Manatee	<i>Trichechus manatus</i>	--	E	Gulf and bay system	Yes	No
MOLLUSKS						
Louisiana Pigtoe	<i>Pleurobema riddellii</i>	T	*	Streams and moderate-sized rivers, mud, sand, and gravel	Yes	No
Sandbank Pocketbook	<i>Lampsilis satura</i>	T	*	Rivers with moderate to swift flows, gravel-sand, and sand	Yes	No
Texas Pigtoe	<i>Fusconaia askewi</i>	T	*	Rivers with mixed mud, sand, and fine gravel in protected areas	Yes	No
REPTILES						
Alligator Snapping Turtle	<i>Macrochelys temminckii</i>	T	*	Deep water of rivers and canals	Yes	No
Green Sea Turtle	<i>Chelonia mydas</i>	T	E, T†	Gulf and bay system	No	No
Kemp's Ridley Sea Turtle	<i>Lepidochelys kempii</i>	E	E†	Gulf and bay system	No	No
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	E	E†	Gulf and bay system	No	No
Loggerhead Sea Turtle	<i>Caretta caretta</i>	T	T†	Gulf and bay system	No	No
Texas Horned Lizard	<i>Phrynosoma cornutum</i>	T	*	Open, semi-arid regions, with bunch grass	No	No
Timber/Canebrake Rattlesnake	<i>Crotalus horridus</i>	T	*	Swamps/floodplains of hardwood/upland pine	No	No
VASCULAR PLANTS						
Awnless Bluestem	<i>Bothriochloa exaristata</i>	SGCN	*	Coastal prairies on black clay	No	No
Coastal Gay-feather	<i>Liatris bracteata</i>	SGCN		Coastal prairie grasslands	No	No
Giant Sharpstem Umbrella-sedge	<i>Cyperus cephalanthus</i>	SGCN		On saturated, fine sandy loam soils or on heavy black clay	No	No
Goldenwave Tickseed	<i>Coreopsis intermedia</i>	SGCN	*	Deep sandy soils of sandhills in or along margins of post oak woodlands and pine-oak forests	No	No
Houston Daisy	<i>Rayjacksonia aurea</i>	SGCN		Barren, sparsely-vegetated saline slicks, pimple mounds, on sandy to sandy loam	No	No
Indianola Beakrush	<i>Rhynchospora indianolensis</i>	SGCN		Cattle pastures during wet years	No	No
Panicled Indogobush	<i>Amorpha paniculata</i>	SGCN		Acid seep forests, peat bogs, wet floodplain forests, and seasonal wetlands on the edge of saline prairies	No	No
Texas Ladies-tresses	<i>Spiranthes brevilabris</i> var <i>brevilabris</i>	SGCN		Sandy soils in moist prairies	No	No

Common Name	Scientific Name	State Status	Federal Status	Habitat Description	Habitat Present	Effect/Impact
Texas Meadow-rue	<i>Thalictrum texanum</i>	SGCN		Woodlands and woodland margins on sandy loam, on pimple mounds, clay pan savannahs	Yes	Yes
Texas Prairie Dawn	<i>Hymenoxys texana</i>	E	E	Poorly drained areas in open grasslands; pimple mounds	No	No
Texas Tauschia	<i>Tauschia texana</i>	SGCN		Occurs in loamy soils in deciduous forests or woodlands on river and stream terraces	No	No
Texas Windmill Grass	<i>Chloris texensis</i>	SGCN		Sandy to sandy loam soils in bare areas	Yes	Yes
Threeflower Broomweed	<i>Thurovia triflora</i>	SGCN		Low vegetation, on light-colored silt or fine sand over saline clay	No	No

Legend

* These species occur on the State listing of threatened or endangered species; however, they are not federally listed at this time by the U.S. Fish and Wildlife Service (8/1/16).

† These species are listed by the U.S. Wildlife Service; however, they are not listed to occur within this county by the Clear Lake office of the U.S. Fish and Wildlife Service (8/1/16).

– Not listed by Texas Parks and Wildlife for this county (8/1/16).

‡ Under Review for Federal Listing (8/1/16).

E = Endangered, T = Threatened, H = Historical Occurrence, I = Introduced Population, C = Candidate Species, SGCN = Species of Greatest Conservation Need, DM = Delisted Taxon, recovered, being monitored first five years,

D = Delisted Taxon, SAT = Similarity of Appearance to a Threatened Taxon, PDL = Proposed Delisting,

Δ = Protected by the Bald and Golden Eagle Protection Act, D = Delisted and Past 5 Year Monitoring Plan

Houston Toad

The Houston toad (*Anaxyrus houstonensis*) is listed as endangered by both TPWD and USFWS, although it is not listed as occurring in the project area by the USFWS IPaC or in Harris County per the USFWS county list. The TPWD Natural Diversity Database (NDD) reports two occurrences of this species within 10 miles of the project area (TPWD 2015a). These occurrences were recorded in 1976.

This bufonid prefers areas with a sandy substrate, and breeding habitat is in ephemeral pools and stock tanks (University of Texas [UT] 2015). Breeding typically occurs in spring, especially after large rainfall events. During periods of inactivity, this species will burrow in sandy soils. It is typically located in areas underlain by the Sparta, Carrizo, Goliad, Queen City, Recklaw, Weches, and Willis geologic formations. The Houston Toad is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Southern Crawfish Frog

The Southern crawfish frog (*Lithobates areolatus areolatus*) is listed as a SGCN by TPWD. This species has no regulatory status as a threatened or endangered species in Harris County by either TPWD or USFWS.

The Southern crawfish frog is nocturnal and is rarely seen outside of burrows except during breeding season when the call of breeding males can be heard over great distances (UT, 2015). This frog primarily feeds on crawfish, but is known to eat insects and other frogs. Breeding takes place all year with a peak from February to June. Eggs are laid and larvae develop in temporary water such as flooded fields, ditches, farm ponds and small lakes. This species can be found in abandoned crawfish holes and small mammal burrows and inhabits moist meadows, pasturelands, pine scrub, and river floodplains. The Southern crawfish frog is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area, especially the narrow, urbanized riverine floodplains. The proposed project would have no impact on this species.

American Peregrine Falcon

American peregrine falcon (*Falco peregrinus anatum*), and arctic peregrine falcon (*Falco peregrinus tundrius*) are subspecies of the peregrine falcon (*Falco peregrinus*). Both subspecies are found in Texas. These two subspecies were formerly federally listed, but were delisted by the USFWS in 1994 and 1999, respectively. TPWD lists the American peregrine falcon as threatened and the arctic peregrine falcon as a SGCN in Harris County. USFSW IPaC lists peregrine falcon (*Falco peregrinus*) occurring in Harris County as a wintering migrant. It is protected under the Migratory Bird Treaty Act (MBTA).

This falcon has a gray dorsum and a lighter venter with spotting on the belly and thighs. Its crown and cheek are black, and it has a white neck patch. It is usually found in open areas where it feeds on smaller birds. The decline of the peregrine falcon coincided with the introduction of DDT. Since DDT was banned in 1972, falcon populations have increased. In Texas, the American peregrine falcon is a resident of the Trans-Pecos region, while the range of the arctic peregrine falcon is limited to the Texas coast during fall and spring migrations. The American peregrine falcon is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) is listed as threatened by TPWD, and was delisted by USFWS on July 9, 2007. USFWS IPaC lists the bald eagle as a year-round resident in Harris County. The bald eagle is protected under the MBTA and the Bald and Golden Eagle Protection Act. The NDD reports one occurrence of this species within 10 miles of the project area, dating from 2003. Bald eagles have been observed to be actively nesting on Spring Creek, approximately 9 miles northwest of the project area, since 1990.

Since it was originally listed as endangered in 1978, bald eagle populations have steadily increased throughout the lower 48 states. From 1963 to 2007, the number of breeding pairs in the contiguous United States has increased from 487 to 11,040, according to the Center for Biological Diversity. This large raptor ranges over much of the United States and Canada. Bald eagles are primarily piscivorous, and prefer habitats associated with large bodies of water.

In Texas, the bald eagle is found along quiet rivers, coastal areas, and lakeshores with large, tall trees. Man-made reservoirs also provide excellent habitat. It breeds in the eastern third of the state, and winters wherever open water occurs. Breeding bald eagles build large stick nests lined with leaves, grass, and Spanish moss, and use them for several years. These nests can weigh several hundred pounds and can be as large as 6 feet in diameter. Wintering and nesting activity occurs mainly near large freshwater impoundments with standing timber located in or around water. The nesting period usually extends from October 1 to May 15. Breeding pairs, which generally bond for life, return to their same territory year after year. Nesting sites are often situated on ecotonal boundaries of forest, marsh, and open water, typically in trees higher than 40 feet, and more than 0.75 mile from low-density human disturbance and more than 1.2 miles from medium to high-density human disturbance. The bald eagle is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Black Rail

The black rail (*Laterallus jamaicensis*) is listed as a SGCN by TPWD. This species has no regulatory status as a threatened or endangered species in Harris County by either TPWD or USFWS. However, the black rail is protected under the MBTA.

The black rail is small, secretive, and runs on the ground, not flushing easily from salt marsh (Texas A&M Agrilife Extension [TxA&MAE] 2015). This tiny rail is approximately the size of a house sparrow and has a bobbed tail. It is black and grayish with white speckling on the back and a brown patch on the back of the neck. It is usually undetected, except for its distinctive vocalization. This species is generally found in association with tuft-forming cordgrass. Black rails build their nests of green or dead grasses, either on moist ground or suspended from seed or grass stalks. Egg-laying may occur from May through August. The black rail is a permanent resident in upper tidal marshes along the Gulf Coast from Texas to Florida. It is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Brown Pelican

The brown pelican (*Pelecanus occidentalis*) is currently listed as a SGCN by TPWD. As of December 17, 2009, the brown pelican has been delisted by the USFWS. The USFWS IPaC does not list the brown pelican as occurring in the project area. Also, the USFWS does not list the brown pelican as occurring in Harris County.

Brown pelicans nest in colonies mostly on small coastal islands (TxA&MAE 2015). Ground nests vary from practically nothing to well-built nests of sticks, reeds, straws, palmetto leaves, and grasses. Tree nests are made of similar materials, but are more firmly constructed. Feeding occurs primarily in shallow estuarine waters. These birds seldom venture more than 20 miles out to sea, except to take advantage of especially good fishing conditions, and even then it is rare to find one more than 40 miles out. Menhaden comprises approximately 90 to 95 percent of the diet of many colonies from South Carolina to Texas. Brown pelicans also feed on pigfish, pinfish, herring, sheepshead, silversides, mullet, topminnows, and some crustaceans. Sand spits and offshore sandbars are used extensively as daily loafing and nocturnal roost areas. Preferred nesting sites are small coastal islands that provide protection from mammalian predators, especially raccoons, and are at a sufficient elevation to prevent widespread flooding of nests. Brown pelicans occur along the entire northeastern coast of Texas. The brown pelican is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Henslow's Sparrow

The Henslow's sparrow (*Ammodramus henslowii*) is listed as a SGCN by TPWD, but has no protected regulatory status as a threatened or endangered species in the project area from TPWD, or USFWS. However, the Henslow's sparrow is protected under the MBTA.

Henslow's sparrow is identified by a greenish-toned head, neck, and face, and dark reddish-brown wings and back. It has two streaks on the side of its throat, and more streaking on its breast. It has a short tail, a pale bill, and black streaks from the eyes. This inconspicuous occupant of grassland habitats is furtive and often overlooked. During the breeding season, the Henslow's sparrow has very specific habitat requirements (USFWS 2012b). It is found in fallow fields with tall, dense, grassy, and weedy cover, with a high density of standing dead vegetation as well as scattered bushes or very small trees. Wintering individuals in Texas are found in weedy fields or cutover areas where bunch grasses are abundant, along with vines and brambles. A key component to its habitat is bare ground for running or walking. The Henslow's sparrow is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Least Tern

The least tern is not state listed and is federally listed as endangered within the project area because part of the project is more than 50 miles from the Gulf of Mexico coastline. The USFWS IPaC website states that the interior least tern is conditionally listed and should be considered only if the project is related to wind energy generation. The proposed project is a highway project; therefore, the interior least tern would not be considered in the review of the proposed project. Additionally, the least tern is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Mountain Plover

The mountain plover (*Charadrius montanus*) is listed as a SGCN by TPWD, but has no protected regulatory status in the project area under either TPWD or USFWS. The mountain plover is not listed as occurring in the project area by the USFWS IPaC.

The mountain plover breeds in the upland short-grass prairies and level plateaus of the western United States and spends winters along the Pacific and Gulf Coasts where it occupies coastal prairies (TxA&MAE 2015). It is usually found in short-grass prairies, overgrazed pastures, plowed fields, and deserts. The mountain plover prefers grasslands in all seasons, but occasionally uses sandy, semi-arid plains dominated by xeric plants for breeding, and cultivated fields for feeding. It is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Piping Plover

The piping plover is state and federally listed as threatened. The piping plover is a statewide migrant that winters along the Gulf Coast. Preferred wintering habitats include beaches, sandflats, mudflats, algal mats, and dunes along the Gulf Coast and adjacent offshore islands, and spoil islands in intracoastal waterways (Campbell 1995; USFWS 2009b). The piping plover is not expected to occur within the project area because preferred wintering habitat is not present. The proposed project would have no effect on this species.

Red-cockaded Woodpecker

The red-cockaded woodpecker (*Picoides borealis*) is listed as endangered by TPWD and the USFWS, but is not listed as occurring in the project area by the USFWS IPaC or by the USFWS list for Harris County.

The red-cockaded woodpecker has a solid black cap and nape, with prominent white cheek patches. The male has a tiny red streak behind and near the ear (the cockade). The cockade is seldom visible in the field, making it difficult to distinguish males from females. This species is found in mature pine forests of east Texas and the southeastern United States. It is the only species of woodpecker that excavates its cavity exclusively in living pines, including longleaf, shortleaf, slash, and loblolly pines (TxA&MAE 2015). Most cavities are found in trees 60 years to 70 years old or older. A woodpecker group roosts and nests in a cluster of cavity trees that may include up to 30 trees. Preferred cluster sites have a grassy understory with little or no midstory. The red-cockaded woodpecker nests from April through July. It is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Red Knot

The red knot (*Calidrus camitus rufa*) is listed by TPWD as a SGCN and is listed by USFWS as threatened in the project area. In Texas, the red knot is a migrant each spring and fall as it travels between breeding grounds in the far northern portion of the central Canadian Arctic to its wintering areas as far south as the extreme southern end of Tierra del Fuego. In Texas, the red knot is also known to over-winter along the bay

sides of barrier islands (USFWS 2014a). The red knot is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Sprague's Pipit

The Sprague's pipit (*Anthus spragueii*) is considered a SGCN by TPWD, and was considered a federal candidate for listing by the USFWS, which was rescinded April 5, 2016 (USFWS, 2016d). It is no longer listed by the USFWS as a federal candidate species and is not listed in the IPaC as occurring within the project area.

This species is found in grasslands with mid-height vegetation, including upland mixed-grass prairie, alkaline meadows, and wet meadow zones around alkali and freshwater lakes. Habitat during migration and during the winter season consists of pastures and weedy fields, including grasslands with dense herbaceous vegetation or grassy agricultural fields (USFWS 2014b). Reaching an average length of 6.5 inches, adults of this sparrow-sized bird are pale and slender with white outer tail feathers, a thin bill, pale legs, and a heavily streaked back. The Sprague's pipit is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

White-faced Ibis

The white-faced ibis (*Plegadis chihi*) is listed as threatened by TPWD. It has no federal listing status, and is not listed in IPaC as occurring within the project area. The white-faced ibis inhabits bays, marshes, swamps, lakes, ponds, and rivers, and feeds on insects, newts, leeches, earthworms, snails, and crayfish (TxA&MAE 2015). Typical areas of habitation include large marshes and slow-moving, shallow water. This purplish-brown ibis has a green sheen on its wings, a pale bill, pinkish legs, and red eyes. In Texas, nesting occurs between April and June on dead reeds or floating mats of dead plants. It is a common transient along the Texas coastal plain, and is rare in the eastern inland portion of the state. It is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

White-tailed Hawk

The white-tailed hawk (*Buteo albicaudatus*) is listed as threatened by TPWD. It has no federal listing status, nor is it listed in IPaC as occurring within the project area. The white-tailed hawk is a resident of coastal grasslands from the Rio Grande delta to the upper Gulf Coast and farther inland in more arid environments with scattered mesquite, yucca, and large cacti. This gray, rusty-shouldered hawk has a white tail with a broad sub-terminal band, a gray head, a yellow cere, and yellow legs. The white-tailed hawk perches on bushes, trees, utility wires, or on the ground. Its breeding season extends from March to May, and eggs are laid in nests found 5 feet to 15 feet above the ground in sizeable bushes and trees. The white-tailed hawk is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Whooping Crane

The whooping crane (*Grus americana*) is listed as endangered by TPWD and USFWS, but is not listed to occur in the project area by the USFWS per the IPaC or Harris County list. The whooping crane is the tallest bird in North America, reaching up to 5 feet in height (USFWS 2012a). The whooping crane is a white-bodied bird with black legs and a red, black, and white facial pattern. Habitat loss and degradation along with hunting caused declining numbers of these birds until 1939. At that time, only 18 whooping cranes survived. Since then the species has slowly recovered to a current population of over 180 individuals. Habitat for the

whooping crane includes salt flats and marshes and other wetland areas along the Gulf Coast. Its breeding grounds are in northern Canada, and it winters from November until March in the Aransas National Wildlife Refuge north of Rockport, Texas (approximately 160 miles southwest of the project site), as well as at Matagorda Island and St. Joseph's Island in Aransas, Calhoun, and Matagorda Counties. Whooping cranes feed on blue crabs, clams, frogs, minnows, rodents, small birds, and berries. The whooping crane is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Wood Stork

The wood stork (*Mycteria americana*) is listed as threatened by TPWD and endangered by USFWS. It is not listed by USFWS as occurring in Harris County or in the project area.

The wood stork is a large, white-bodied bird with a long, heavy bill and a bald head. It inhabits coastal marshes, bays, and prairie lakes. In Texas, it is a common summer resident along the coastal plain. This species requires dead snags for roosting. The wood stork is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

American Eel

The American eel (*Anguilla rostrata*) is considered a SGCN by TPWD, but has no protected endangered or threatened species regulatory status by either TPWD or USFWS. It is currently under review by the USFWS for federal listing status. It is not listed by the USFWS IPaC as occurring in the project area.

American eels occupy aquatic habitats with access to the ocean (USFWS 2011). Adults spawn once, from January to February. The larvae reside in the upper few hundred feet of the ocean. After metamorphosis, females move into still freshwater areas with muddy bottoms such as large streams and lakes. Females have been known to travel overland in wet areas. After metamorphosis, the males move to brackish estuaries. Halls Bayou, Little White Oak Bayou, White Oak Bayou, and Buffalo Bayou intersect the project area and may provide suboptimal habitat for this species. At this time, these water bodies are anticipated to continue to be bridged with no potential impact on this species. Following final design, an assessment of project impacts on identified water bodies and aquatic species possibly occurring within the water bodies would be conducted to determine if further consideration of potential impacts is needed. Implementation of established BMPs may reduce or eliminate possible scheduling delays for required permitting or agency coordination.

Creek Chubsucker

The creek chubsucker (*Erimyzon oblongus*) is listed as threatened by TPWD. It has no federal listing status. The creek chubsucker is found in small rivers and creeks of various types, but it is seldom found in impoundments. The creek chubsucker can be identified by its olive dorsal color and its small, slightly oblique, nearly terminal mouth. This species can grow to 8.5 inches long, lacks a lateral line, and possesses rounded dorsal fins with 10 to 12 rays. It prefers headwaters, but is known to occur in springs on rare occasions. Young are usually located in headwater rivulets or marshes. The creek chubsucker spawns in densely vegetated river mouths or pools, riffles, lake outlets, and upstream creeks. In Texas, this species is found in river drainages east of the San Jacinto River.

Distribution of this species in Texas is limited to the smaller streams of eastern Texas and to coastal waters of the Brazos River Basin. The creek chubsucker is listed as occurring in the following drainage units: Red River unit (from the mouth upstream to and including the Kiamichi River), Sabine Lake unit (including minor coastal drainages west to Galveston Bay), the Galveston Bay unit (including minor coastal drainages west to

the mouth of the Brazos River), and the Brazos River unit. Halls Bayou, Little White Oak Bayou, White Oak Bayou, and Buffalo Bayou intersect the project area and may provide suboptimal habitat for this species. At this time, these water bodies are anticipated to continue to be bridged with no potential impact on this species. Following final design, an assessment of project impacts on identified water bodies and aquatic species possibly occurring within the water bodies would be conducted to determine if further consideration of potential impacts is needed. Implementation of established BMPs may reduce or eliminate possible scheduling delays for required permitting or agency coordination.

Smalltooth Sawfish

The smalltooth sawfish (*Pristis pectinata*) is listed as endangered by both TPWD and USFWS. It is not listed as occurring in the project area by the USFWS IPaC. The smalltooth sawfish has different life history stages, which have varying patterns of habitat use. Young smalltooth sawfish can be found very close to shore in muddy and sandy bottoms, seldom descending to depths greater than 32 feet in sheltered bays, on shallow banks, and in estuaries or river mouths. Adult smalltooth sawfish are encountered in various habitat types (mangrove, reef, seagrass, and coral), in varying salinity regimes and temperatures, and at various water depths. Smalltooth sawfish feed on a variety of fish species and crustaceans, and generally spend their time in saline or brackish waters. This species is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Louisiana Black Bear

The Louisiana black bear (*Ursus americanus luteolus*) is listed as threatened by TPWD and was delisted from the USFWS endangered and threatened species list on March 11, 2016 (USFWS 2016e). The Louisiana black bear is a subspecies of the black bear. This medium-sized bear can be black, brown, or cinnamon in color. Once historically common throughout the state, this species is now restricted to the mountainous portions of Trans-Pecos Texas. Sightings of individuals dispersing from Louisiana to east Texas are occasionally reported. These bears are found in bottomland hardwood forests and prefer large, undisturbed forested areas. The Louisiana black bear is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Plains Spotted Skunk

The plains spotted skunk (*Spilogale putorius interrupta*) is considered a SGCN by TPWD, but has no protected regulatory status under TPWD or USFWS in the project area. It is currently under review by the USFWS for federal listing status. It is not listed as occurring in the project area by the USFWS IPaC. The NDD reports two occurrences of this species within 10 miles of the project area. These occurrences were recorded in 1988 and 1989.

The plains spotted skunk is characterized by black fur, with white spots in front of the ears and behind the eyes, and four to six broken white stripes along its back and sides. It occurs primarily in wooded areas and tall-grass prairies, and prefers rocky canyons and outcrops when available. It is rare in the short-grass plains. This species is known to den in or under buildings. Prey varies with the seasons and includes cottontails, mice, insects, fruits, birds, and bird eggs. Because of the limited forested acreage and highly urbanized character of the area surrounding the proposed project, it is unlikely that the plains spotted skunk would be present within the project area. BMPs would be implemented to reduce possible impacts to this species. The proposed project would have no impact on the plains spotted skunk.

Rafinesque's Big-eared Bat

Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) is listed as threatened by TPWD. It has no federal listing status. This medium-sized chiropteran has very large ears (1 inch in length) and a large facial gland on each side of the snout. The pelt is gray on the dorsum and nearly white on the venter. This small mammal roosts in tree cavities of bottomland hardwoods, concrete culverts, and abandoned man-made structures. This species is found primarily in the deep, mature pinewoods of east Texas. This bat is a strong, agile flyer, and while specific prey items are not known, small night-flying insects likely comprise the bulk of its diet. Proposed project improvements could impact habitat preferred by this bat species. BMPs would be implemented to reduce possible impacts.

Red Wolf

The red wolf (*Canis rufus*) is listed as endangered by TPWD and USFWS, but it is not listed as occurring in Harris County by the USFWS in either the IPaC or county list. The red wolf is intermediate in size between gray wolves and coyotes. It is a slender, long-legged wolf with reddish fur behind the ears and along the neck and legs. Preferred habitat includes brushy, forested areas and coastal prairies. Formerly, red wolves ranged throughout the eastern half of Texas, but their numbers and range quickly declined because of intensive land use changes and predator control programs in the region. Also, early lumbering and farming practices allowed the coyote to expand its range into east Texas. The hybrid offspring of interbreeding red wolves and coyotes more closely resembled coyotes, and the genetic identity of the red wolf was gradually suppressed. The red wolf is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Southeastern Myotis Bat

The southeastern myotis bat (*Myotis austroriparius*) is listed as a SGCN by TPWD. It has no federal listing status. The southeastern myotis bat is a small bat with dense, dull, woolly fur. Its upper parts are brownish to sooty, and the fur of the underparts has white tips and black bases. It is generally distributed throughout the United States. This species is primarily a cave bat in most of the United States, but in Texas and most of Louisiana it seeks out roosts in human habitations and structures. It has been found in crevices between bridge timbers, culverts, drainage pipes, boathouses, and hollow trees. The southeastern myotis bat usually lives close to water. Proposed project improvements could impact habitat preferred by this bat species. BMPs would be implemented to reduce possible impacts.

West Indian Manatee

The West Indian manatee (*Trichechus manatus*) is not listed by TPWD, but is listed as endangered by the USFWS. Manatees are massive torpedo-shaped animals with skin that is uniformly dark grey, wrinkled, sparsely haired, and rubberlike. Adults average about 10 feet in length and 2,200 pounds in weight. Manatees live in freshwater, brackish, and marine habitats and their preferred food is submerged, emergent, and floating vegetation. During the winter, cold temperatures keep the manatees concentrated in peninsular Florida and many rely on warm water from natural springs and power plant outfalls. During the summer months, manatees have known to range as far north as Rhode Island and as far west as Texas. The West Indian manatee is not expected to occur within the project area because of a lack of sufficient food resources within the water courses traversing the project area. Additionally, the major water courses in the proposed project area that are currently bridged are anticipated to continue to be bridged. The proposed project would have no effect on this species.

Louisiana Pigtoe

The Louisiana pigtoe (*Pleurobema riddellii*) is considered threatened by TPWD. It has no federal listing status. The Louisiana pigtoe is a freshwater mollusk that typically inhabits flowing streams and moderate-

sized rivers (typically less than 20 feet deep) on substrates of mud, sand, and gravel (Howells et al. 1996). This species is subquadrate to nearly round and subtriangular in outline. It reaches 2.5 to 2.8 inches in length, and contains white nacre with a greenish-brown, chestnut, or black epidermis. In Texas, this species is known to occur in the Trinity, Neches, and Sabine River drainage systems. Halls Bayou, Little White Oak Bayou, White Oak Bayou, and Buffalo Bayou intersect the project area and may provide suboptimal habitat for this species. At this time, these water bodies are anticipated to continue to be bridged with no potential impact on this species. Following final design, an assessment of project impacts on identified water bodies and aquatic species possibly occurring within the water bodies would be conducted to determine if further consideration of potential impacts is needed. Implementation of established BMPs may reduce or eliminate possible scheduling delays for required permitting or agency coordination.

Sandbank Pocketbook

The sandbank pocketbook (*Lampsilis satura*) is listed as threatened by TPWD, but is not listed by the USFWS. The sandbank pocketbook is a freshwater mollusk that typically inhabits small to large rivers with moderate flow and swift current on gravel, gravel-sand, and sand bottoms (Howells et al. 1996). In Texas, this species is known to occur in east Texas from Big Cypress Bayou south to the San Jacinto River and Neches River basins. Halls Bayou, Little White Oak Bayou, White Oak Bayou, and Buffalo Bayou intersect the project area and may provide suboptimal habitat for this species. At this time, these water bodies are anticipated to continue to be bridged with no potential impact on this species. Following final design, an assessment of project impacts on identified water bodies and aquatic species possibly occurring within the water bodies would be conducted to determine if further consideration of potential impacts is needed. Implementation of established BMPs may reduce or eliminate possible scheduling delays for required permitting or agency coordination.

Texas Pigtoe

The Texas pigtoe (*Fusconaia askewi*) is listed as threatened by TPWD. It has no federal listing status. The Texas pigtoe is a freshwater mollusk that typically inhabits rivers with mixed mud, sand, and fine gravel substrates (Howells et al. 1996). It is often found in protected areas under fallen trees or other structures. In Texas, it is known to occur within east Texas river basins, including the Brazos, Neches, Sabine, and San Jacinto River basins. This species is dull reddish brown, dark brown, or pale tan with darker rays. Halls Bayou, Little White Oak Bayou, White Oak Bayou, and Buffalo Bayou intersect the project area and may provide suboptimal habitat for this species. At this time, these water bodies are anticipated to continue to be bridged with no potential impact on this species. Following final design, an assessment of project impacts on identified water bodies and aquatic species possibly occurring within the water bodies would be conducted to determine if further consideration of potential impacts is needed. Implementation of established BMPs may reduce or eliminate possible scheduling delays for required permitting or agency coordination.

Alligator Snapping Turtle

The alligator snapping turtle (*Macrolemys temmincki*) is listed as threatened by TPWD. It is currently under review by the USFWS for federal listing. The NDD lists one occurrence of this species in 1968 within 10 miles of the project area. The alligator snapping turtle is the largest freshwater turtle in North America, reaching up to 200 pounds (U.S. Geological Survey [USGS] 2015). It has a large head, powerful jaws, and a hooked beak. Three rows of dorsal keels run longitudinally down the carapace, and the tail is relatively long. It is almost entirely aquatic, rarely leaving the water except to nest. It is opportunistic in its diet, eating fish, other turtles, clams and mussels, acorns, tupelo fruit, and other assorted animals and vegetation. This turtle is found in deep water in rivers, swamps, bayous, ponds near deep running water, canals, lakes, and oxbows. It prefers muddy bottoms and abundant aquatic vegetation, but is infrequently located in brackish coastal waters. Halls Bayou, Little White Oak Bayou, White Oak Bayou, and Buffalo Bayou intersect the project area and may

provide suboptimal habitat for this species. At this time, these water bodies are anticipated to continue to be bridged with no potential impact on this species. Following final design, an assessment of project impacts on identified water bodies and aquatic species possibly occurring within the water bodies would be conducted to determine if further consideration of potential impacts is needed. Implementation of established BMPs may reduce or eliminate possible scheduling delays for required permitting or agency coordination.

Green Sea Turtle

The green sea turtle (*Chelonia mydas*) is listed as threatened by both TPWD and USFWS, but is not listed by the USFWS as occurring in the project area (IPaC) or Harris County. The green sea turtle is found primarily in tropical waters of the Atlantic Ocean and Gulf of Mexico. Occasionally, individuals are observed off the Texas coast. Mating occurs from March to October, just offshore from nesting beaches (UT 2015). In the Gulf of Mexico, nesting occurs between June and August. Females deposit egg clutches on high-energy beaches, usually on islands, where a deep nest cavity can be excavated above the high water line. When turtles reach a carapace length of approximately 7.9 to 9.8 inches, they leave the pelagic habitat and enter benthic feeding grounds. The green sea turtle is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Kemp's Ridley Sea Turtle

The Kemp's Ridley sea turtle (*Lepidochelys kempii*) is listed as endangered by both TPWD and USFWS, but is not listed by the USFWS as occurring within the project area (IPaC) or Harris County. The Kemp's Ridley sea turtle is often observed in gulf and bay systems where adults stay in the shallow waters of the continental shelf (UT 2015). They feed primarily on crabs, but snails, clams, crustaceans, and plants make up a large percentage of their diet. Kemp's Ridley sea turtles generally nest on sandy beaches between April and August. This species is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on the Kemp's Ridley sea turtle.

Leatherback Sea Turtle

The leatherback sea turtle (*Dermochelys coriacea*) is listed as endangered by both TPWD and USFWS, but is not listed by the USFWS as occurring within the project area (IPaC) or Harris County. The leatherback sea turtle is encountered primarily off the Atlantic coast, but it has been known to reside in the Gulf of Mexico (UT 2015). It is a rare visitor to the Texas coast. This species is highly pelagic and only moves into coastal waters during the reproductive season. Nesting is concentrated in the Caribbean on open-access beaches. The leatherback sea turtle is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Loggerhead Sea Turtle

The loggerhead sea turtle (*Caretta caretta*) is listed as threatened by TPWD and USFWS, but is not listed by the USFWS as occurring in the project area (IPaC) or Harris County. Loggerhead sea turtles are circumglobal, found on the continental shelf, bays, estuaries, and lagoons in tropical to temperate waters (UT 2015). Mating takes place from late March to early June, and eggs are laid throughout the summer. Nesting sites are found on the United States Atlantic and Gulf coasts. Hatchlings move towards the coastal waters and out to sea, reaching maturity between 16 years to 40 years of age. Hatchlings eat animals found in sea grass mats along drift lines and eddies. Juveniles and adults prey on conch, clams, crabs, shrimp, sponges, squid, and fish. On the northern Gulf Coast of Texas, nesting by loggerheads is rare, but one nest was found approximately 12 years ago on Bolivar Peninsula. The loggerhead sea turtle is not expected to occur within

the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Texas Horned Lizard

The Texas horned lizard (*Phrynosoma cornutum*) is listed as threatened by TPWD. It has no federal listing status. This lizard has a historical range from northern Kansas to northern Mexico and eastern Arizona to western Louisiana. Throughout much of this range, Texas horned lizard populations have been declining. In Texas, it is now found in abundance only in the western half of the state (UT 2015). This lizard can be identified by its broad body, short tail, a row of spines at the rear of the head, and two rows of fringe scales on each side of the abdomen. It is usually a shade of brown, but some specimens are grayish in color. It is a small lizard, with a maximum length of 7 inches. This species is typically found in open ground with sparse vegetation, and is often found in areas of sandy, rocky, or loamy soils. It feeds primarily on harvester ants (*Pogonomyrmex* spp.). It runs surprisingly fast, and often takes refuge in mammal burrows, rock piles, and clumps of vegetation. The Texas horned lizard is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Timber/Canebrake Rattlesnake

The timber/canebrake rattlesnake (*Crotalus horridus*) is listed as threatened by TPWD. It has no federal listing status. This large rattlesnake is unmistakable, with black chevrons crossing a yellow to tan background, a cinnamon vertebral stripe, and a solid black tail (UT 2015). It exists throughout eastern Texas in localized populations found in upland pine and swamps/floodplains of hardwood forests. This snake feeds on a variety of endothermic prey such as rodents, squirrels, and rabbits. Habitat loss and extermination by humans have contributed to its decline. The timber/canebrake rattlesnake is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Awnless Bluestem

The awnless bluestem (*Bothriochloa exaristata*) is considered a SGCN by TPWD. It has no federal listing status. The awnless bluestem is a perennial grass that has adapted to heavy, moist, black, clayey soils of coastal prairies (Gould 1975; TPWD 2016). Under favorable growing conditions, awnless bluestem will flower throughout the year. The awnless bluestem is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Coastal Gay-feather

The coastal gay-feather (*Liatris bracteata*) is considered a SGCN by TPWD. It has no federal listing status. The NDD reports two occurrences of this species within 10 miles of the project area. These occurrences were recorded in 1978 and 1985. The coastal gay-feather grows in black clay soils in coastal prairie remnants. This plant is a stiffly upright, widely spreading perennial that grows up to 30 inches in height (Pool et al. 2007). In southeastern Texas, the coastal gay-feather can be found from north of Tivoli and northwest of Austwell to south of Gregory, in Refugio, Aransas, and San Patricio Counties. Its showy and distinct purple flowers bloom in late summer through early fall (predominantly from September to November). Although this species can be positively identified throughout its growing season, it is easily recognizable when in bloom. The coastal gay-feather is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Giant Sharpstem Umbrella-Sedge

The giant sharpstem umbrella-sedge (*Cyperus cephalanthus*) is considered a SGCN by TPWD. It has no federal listing status. The giant sharpstem umbrella-sedge is a perennial herb that grows in periodically wet blackland prairie soils (Pool et al. 2007). Fruiting for this species occurs during the summer months. This species is erect and rhizomatous. The combination of spreading floral scales and scabrid culms separates this very rare species from any other similar species that occur in its range. The giant sharpstem umbrella-sedge is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Goldenwave Tickseed

The goldenwave tickseed (*Coreopsis intermedia*) is considered a SGCN by TPWD. It has no federal listing status. The goldenwave tickseed is a perennial flower that is found in deep sandy soils of sandhills in openings in or along margins of post oak woodlands and pine-oak forests of east Texas (TPWD 2016). The goldenwave tickseed blooms and set seeds from May to August. This species is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on the goldenwave tickseed.

Houston Daisy

The Houston daisy (*Rayjacksonia aurea*) is considered a SGCN by TPWD. It has no federal listing status. The NDD reports five occurrences of this species within 10 miles of the project area. These occurrences were recorded between 1964 and 2002. The Houston daisy is an annual tap-rooted herb that grows in seasonally wet saline barren areas, and is often associated with mima mounds. This species is nearly glabrous, grows 6 to 12 inches tall, and is freely branched. The leaves are linear-oblongate, 0.4 inch to 1.6 inches long, and 0.04 to 0.08 inch broad, with two to four remote salient teeth on each side (Pool et al. 2007). The flower disk and rays are yellow, and the pappus of ray and disk are alike. The flowers of this species are present and identifiable in October. The Houston daisy is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Indianola Beakrush

The Indianola beakrush (*Rhynchospora indianolensis*) is a perennial herb that can be locally abundant in cattle pastures in some areas. It is considered a SGCN by TPWD, but has no federal listing status. During wet years it possibly may become a management problem (TPWD 2016). This herb sets flowers and fruit between April and November. The Indianola beakrush is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Panicled Indigobush

The panicled indigobush (*Amorpha paniculata*) is considered a SGCN by TPWD. It has no federal listing status. This species is a stout shrub, approximately 10 feet tall, that grows in acid seep forests, peat bogs, wet floodplain forests, and seasonal wetlands on the edge of saline prairies in east Texas. It is distinguished from other *Amorpha* species by its fuzzy leaflets with prominent raised veins underneath, and the flower panicles, which are 8 to 16 inches long and held above the foliage (Louisiana Department of Wildlife and Fisheries [LDWF] 2015).

Fewer than 15 populations are known; most or all are very small and are threatened by shading or lack of fire. Additional populations are expected to be identified with more survey work (very little inventory survey has been conducted), but the known population size and area of occupancy is very small. The panicled

indigobush is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Texas Ladies'-tresses

The Texas ladies'-tresses (*Spiranthes brevilabris* var. *brevilabris*) is considered a SGCN species by TPWD. It has no federal listing status. Texas ladies'-tresses is a delicate, nearly ephemeral orchid, producing winter rosettes that flower between February and April. Diagnostic features include small flowers with a yellowish central lip, and oval leaves that persist through anthesis and lie flat at the base of the flowers.

This species is a southeastern coastal plain endemic, currently known from two counties in eastern Texas (Walker and San Jacinto Counties). These sites have relatively small numbers of plants (22 and 25) and high-quality habitat; one site is within a National Forest and the other is on timber company-owned lands. This species is found in sandy soil in moist prairies, including blackland/Fleming prairies in Texas (calcareous prairie pockets surrounded by pines). This species is also known to exist in pine-hardwood forest, open pinelands, wetland pine savannahs/flatwoods, and dry to moist fields, meadows, and roadsides (Liggio and Liggio 1999). The Texas ladies'-tresses is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Texas Meadow-Rue

The Texas meadow-rue (*Thalictrum texanum*) is considered a SGCN by TPWD. It has no federal listing status. The NDD reports one occurrence of this species within 10 miles of the project area. This occurrence was recorded in 1976.

The Texas meadow-rue is a perennial herb that grows in damp, sandy soils in mesic woodlands and partially shaded ditches (Pool et al. 2007). This species is rigid and erect (1.5 feet high) with non-ribbed, irregular roots that turn black when dry. This species is identifiable throughout its growing season and is easily recognizable when in bloom. There are few, if any, areas within the proposed project area that have not been disturbed or developed. Within these undisturbed areas, it is possible that this species may be present and the proposed project may affect this plant species.

Texas Prairie Dawn-Flower

The Texas prairie dawn-flower (*Hymenoxys texana*) is listed as endangered by both TPWD and USFWS. The NDD reports nine occurrences of Texas prairie dawn-flower within 10 miles of the project area. These occurrences were recorded between 1988 and 2003. This species is endemic to Harris County and is found in poorly drained depressions. It prefers sparsely vegetated areas at the base of mima mounds in open grasslands or almost barren areas on slightly saline soils. The Texas prairie dawn-flower blooms from March to early April (Pool et al. 2007). This small, delicate annual, standing from 1 inch to 6 inches tall, expresses itself only between the months of January and April during some years but not in others. The Texas prairie dawn-flower is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no effect on this species.

Texas Tauschia

The Texas tauschia (*Tauschia texana*) is a perennial herb that occurs in loamy soils in deciduous forests or woodlands on river and stream terraces. It is considered a SGCN by TPWD (TPWD 2016), but has no federal listing status. Texas tauschia has yellow flowers that bloom and fruit in February to April (Lady Bird Johnson Wildflower Center [LBJWC] 2016). This species is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on the Texas tauschia.

Texas Windmill Grass

Texas windmill-grass (*Chloris texensis*) is considered a SGCN by TPWD. It has no federal listing status. The NDD reports three occurrences of Texas windmill-grass within 10 miles of the project area. These occurrences were recorded between 1976 and 1999. Texas windmill-grass is a tufted, warm-season perennial grass that grows in sand and sandy loam soils of the Texas plains in open or barren areas (Pool et al. 2007). It consists of either culms or tall (up to 1.5 feet), erect, glabrous stems. This species has scabrous basal leaves with blades up to 6 inches long and 1.6 inches wide. Texas windmill-grass has brown to yellowish-brown, awnless, and long lanceolate leaves. Sterile florets are elliptic and glabrous. This species can be positively identified at any time within the growing season. There are few, if any, areas within the project area that have not been disturbed or developed. Within these undisturbed areas, it is possible that Texas windmill-grass may be present and the proposed project may affect this plant species.

Threeflower Broomweed

Threeflower broomweed (*Thurovia triflora*) is considered a SGCN by TPWD. It has no federal listing status. Threeflower broomweed is an herbaceous perennial that inhabits remnant coastal prairie grasslands with black clay soils (Pool et al. 2007). This species has entire, linear, glabrous leaves and very small white flowers that bloom in late summer through early fall. This species is identifiable throughout its growing season, and is easily recognizable when in bloom. Threeflower broomweed is not expected to occur within the project area because of a lack of suitable habitat in this highly disturbed urbanized area. The proposed project would have no impact on this species.

Impacts to State and Federal Threatened and Endangered Species and Species of Greatest Conservation Need

Site visit surveys of the project area were performed in 2014 and October 2015 by experienced biologists familiar with the flora and fauna of the Texas Gulf Coast.

Potential aquatic habitat for five state-listed threatened species, one SGCN, and one federally-listed endangered species was observed in the project area (*Table 2*). The American eel, creek chubsucker, sandbank pocketbook, Texas pigtoe, Louisiana pigtoe, and alligator snapping turtle are found in freshwater streams and bayous. Halls Bayou, Little White Oak Bayou, White Oak Bayou, and Buffalo Bayou intersect the project area and may provide suboptimal habitat for these species. At this time, these water bodies are anticipated to continue to be bridged with no impacts to these species, including the alligator snapping turtle that was documented by the NDD as occurring within 10 miles of the project area in 1968. Following final design, an assessment of project impacts on identified water bodies and aquatic species possibly occurring within the water bodies will be conducted to determine if further consideration of potential impacts is needed. Implementation of established BMPs may reduce or eliminate possible scheduling delays for required permitting or agency coordination.

Buffalo Bayou within the project area may provide suboptimal habitat for the West Indian manatee, but it is highly unlikely that any manatee would be present, even during the summer months, because of the lack of food resources such as sea grasses. At this time, the proposed project would likely bridge over Buffalo Bayou, with no effects to this species. However, an assessment of potential impacts to the West Indian manatee would be conducted following final design.

Potential terrestrial habitat for one state-listed threatened species and four SGCN was observed in the project area.

The plains spotted skunk, a SGCN, may use degraded forested areas and man-made structures. Limited acreage of forested land was observed within or adjacent to the project area, but could provide suboptimal habitat for this species. Because of the highly urbanized areas surrounding the limited forested acreage it is unlikely that this species would be present within the project area. BMPs would be implemented to reduce possible impacts to the plains spotted skunk.

The Rafinesque's big-eared bat, a state-listed threatened species, and the southeastern myotis bat, a SGCN, may use man-made structures such as bridges or culverts. The existing ROW may provide suboptimal habitat at bridges and culverts where the project area is intersected by bayous and drainage channels, including the crossings of Halls, Little White Oak, White Oak, and Buffalo Bayous. The project improvements could impact habitat preferred by these bat species. BMPs would be implemented to reduce possible impacts to these two bat species.

The Texas meadow-rue, a SGCN, and Texas windmill-grass, a SGCN, may be found in open, barren areas, shaded ditches, and coastal prairie remnants. The roadside ditches and remaining patches of undeveloped land within the project area could potentially provide suboptimal habitat for these species. There are few, if any, areas within the project area that have not been disturbed or developed. Within these undisturbed areas, it is possible that these species may be present and the proposed project may affect these plant species.

The Southern crawfish frog, a SGCN, typically inhabits moist meadows, pasturelands, pine scrub, and river floodplains. No suitable habitat types were identified in the highly urbanized environment of the project area. Additionally, there is no NDD listing of the Southern crawfish frog within 10 miles of the project area. It is unlikely that this frog occurs in the project area; therefore, no potential impacts to this species are expected.

The following threatened and endangered species were also documented by the NDD as occurring within 10 miles of the project area, but no potentially suitable habitat was observed within the project area: the Houston toad, bald eagle, and Texas prairie dawn-flower.

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Biological Evaluation Form

Main CSJ:

Date of Evaluation: September 23, 2015

☐ Project has no Federal nexus.

Proposed Letting Date:

☐ Project not assigned to TxDOT under the NEPA Assignment MOU

District(s): Houston

County(ies): Harris

Roadway Name: Interstate 45

Limits From: Beltway 8 North

Limits To: US 59/Interstate 69 and SH 288 interchange

Project Description:

The environmental review, consultation, and other actions required by applicable Federal environmental laws for this project are being, or have been, carried-out by TxDOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated December 16, 2014, and executed by FHWA and TxDOT.

Endangered Species Act (ESA)

No Is the action area of the proposed project within the range and in suitable habitat of federally protected species?

Date that the IPaC system was accessed: September 22, 2015

Resources consulted or activities conducted to make effect determination (if applicable):

- | | | |
|---|--|---|
| <input checked="" type="checkbox"/> TPWD County List | <input type="checkbox"/> USFWS Critical Habitat Maps | <input type="checkbox"/> Species Expert Consulted |
| <input checked="" type="checkbox"/> Aerial Photography | <input checked="" type="checkbox"/> Coastal Areas Maps | <input checked="" type="checkbox"/> Site Visit |
| <input checked="" type="checkbox"/> Topographic Map | <input type="checkbox"/> Species Study Conducted | <input type="checkbox"/> Karst Zone Maps |
| <input checked="" type="checkbox"/> Ecological Mapping System of Texas (EMST) | <input checked="" type="checkbox"/> Natural Diversity Database (NDD) | |

Other:

Essential Fish Habitat (EFH)

Yes Are tidally influenced waters in the action area of the proposed project?

Date that the NOAA EFH Mapper was accessed: September 23, 2015

No Does the action area of the proposed project contain essential fish habitat?



Coastal Barrier Resources Act (CBRA)

No Is the action area of the proposed project located within a designated CBRA map unit?

Date that the USFWS CBRA Mapper was accessed: September 23, 2015

Comments:

Marine Mammal Protection Act (MMPA)

Yes Is the action area of the proposed project within range of marine mammals and their habitat?

No Is there potential for incidental harassment and/or take of marine mammals?

*Explain:

USFWS indicates that West Indian manatee may be found in Harris County, but it is highly unlikely that the manatee would be found this far up Buffalo Bayou or White Oak Bayou because of lack of habitat.

Migratory Bird Treaty Act (MBTA)

Yes Is there potential for nesting birds to be present in the project action area during construction?

No Were active nests identified during the site survey?

Yes Will BMPs will be incorporated to protect migratory bird nests?

Bald and Golden Eagle Protection Act (BGEPA)

No Does the proposed project have the potential to impact Bald or Golden Eagles?

Comments:

The I-45 corridor is located within a highly urbanized area of Houston, Texas.

Fish and Wildlife Coordination Act (FWCA)

Yes Does the project have impacts on one or more Waters of the U.S. or wetlands?

Yes Is the project covered by a Nationwide Permit?

Yes Is the project covered by an Individual Permit from the USACE?

Comments:

Appropriate permitting would be determined during the detailed design phase of the project.



Executive Order 13112 on Invasive Species

Yes Would the project be in compliance with EO 13112?

Comments:

Executive Memorandum on Beneficial Landscaping

Yes Would landscaping be included in the proposed projects?

Describe landscaping activities:

Yes Would the proposed project be in compliance with the Executive Memorandum on Beneficial Landscaping?

Farmland Protection Policy Act (FPPA)

Yes Would the project require new ROW or permanent easements (do not include temporary easements)?

No Is the project located in a "non-urbanized area" that contain areas mapped as prime, unique, statewide important or locally important farmland by the NRCS Web Soil Survey or [Census Bureau](#)?

Date that the [Web Soil Survey](#) was accessed: September 23, 2015

General Comments



TPWD Analysis Section

Texas Parks and Wildlife Coordination Conditions

1. No Is the project limited to a maintenance activity exempt from coordination?
<http://txdot.gov/inside-tdot/division/environmental/maintenance-program.html>
2. No Has the project previously completed coordination with TPWD?

Tier I Site Assessment

MOU Triggers

1. Yes Is the project within range of a state threatened or endangered species or SGCN and suitable habitat is present?

*Explanation:

There is potential habitat for 11 species. 6 Threatened: Creek Chubsucker, Parinesque's Big eared Bat, Louisiana Pigtoe, Sandback Pocketbook, Texas Pigtoe, and Alligator Sanpping Turtle. 5 SGCN: American eel, Plains Spotted Skunk, Southeastern Myotis Bat, Texas Meadow-rue, and Texas Windmill Grass. Only possible suitable habitat that may be affected is for Southeastern Myotis Bat, Texas Meadow-rue, and Texas Windmill Grass, which are all listed as SGCN.

Date TPWD County List Accessed: September 23, 2015

Date that the NDD was accessed: October 30, 2015

What agency performed the NDD search? TPWD

What version of the NDD was used? October 30, 2015



NDD Search Results for EOIDs and Tracked Managed Areas

EOID Number	Common Name	Scientific Name	Listing Status	Buffer Zone
11461	Southern Crawfish Frog	<i>Lithobates areolatus areolatus</i>	SGCN	1.5 Mile
11462	Southern Crawfish Frog	<i>Lithobates areolatus areolatus</i>	SGCN	10 Mile
472	Bald Eagle	<i>Haliaeetus leucocephalus</i>	T	10 Mile
7144	Houston Daisy	<i>Rayjacksonia aurea</i>	SGCN	10 Mile
2849	Houston Daisy	<i>Rayjacksonia aurea</i>	SGCN	10 Mile
473	Plains Spotted Skunk	<i>Spilogale putorius interrupta</i>	SGCN	10 Mile
4284	Texas Windmill Grass	<i>Chloris texensis</i>	SGCN	10 Mile
6775	Texas Prairie Dawn	<i>Hymenoxys texana</i>	E	10 Mile
1954	Texas Prairie Dawn	<i>Hymenoxys texana</i>	E	10 Mile
1329	Southern Crawfish Frog	<i>Lithobates areolatus areolatus</i>	SGCN	10 Mile
7552	Alligator Snapping Turtle	<i>Macrochelys temminckii</i>	T	10 Mile
4408	Houston Daisy	<i>Rayjacksonia aurea</i>	SGCN	10 Mile
1657	Water Oak-willow Oak Series	<i>Quercus nigra-quercus phellos series</i>	G4S3	10 Mile
11463	Southern Crawfish Frog	<i>Lithobates areolatus areolatus</i>	SGCN	10 Mile
7944	Southern Crawfish Frog	<i>Lithobates areolatus areolatus</i>	SGCN	10 Mile
7697	Texas Meadow-rue	<i>Thalictrum texanum</i>	SGCN	10 Mile
1901	Texas Windmill Grass	<i>Chloris texensis</i>	SGCN	10 Mile
26	Texas Prairie Dawn	<i>Hymenoxys texana</i>	E	10 Mile
3565	Texas Prairie Dawn	<i>Hymenoxys texana</i>	E	10 Mile
3159	Houston Toad	<i>Anaxyrus houstonensis</i>	E	10 Mile

1.1 Yes Does the BMP PA eliminate the requirement to coordinate for all species?

*Explanation:

The only species that may be affected are listed as SGCN and have no protection. Southeastern Myotis bat is primarily a cave bat that has been found between bridge timbers and in culverts. Many of the existing culverts would not be affected or would be extended. Texas Meadow-rue and Texas Windmill Grass are SGCN plants.

2. No NDD and TCAP review indicates adverse impacts to remnant vegetation?

*Explanation:

3. Yes Does the project require a NWP with PCN or IP by USACE?

*Explanation:

Crossing of streams and bayous may require NWP with PCN or IP. Until selection of the preferred alternative and detailed construction plans have been finalized, it is assumed NWP(s) with PCN or IP will be required.

4. No Does the project include more than 200 linear feet of stream channel for each single and complete crossing of one or more of the following that is not already channelized or otherwise maintained:

 Channel realignment; or

 Stream bed or stream bank excavation, scraping, clearing, or other permanent disturbance.



Biological Evaluation Form

*Explanation:

All the stream crossings have already been channelized and maintained.

5. No Does the project contain known isolated wetlands outside the TxDOT ROW that will be directly impacted by the project?

*Explanation:

The project is located within highly urbanized areas of Houston, Texas.

6. No Would the project impact at least 0.10 acre of riparian vegetation?

*Explanation:

The majority of the riparian vegetation is located adjacent to Buffalo Bayou, which will be bridged.

7. No Does project disturb a habitat type in an area equal to or greater than the area of disturbance indicated in the Threshold Table Programmatic Agreement?

*Explanation:

It is unlikely that any of the estimated 3.75 acres of riparian vegetation would be disturbed by the proposed project, since the majority of the riparian areas are presently bridged, and the proposed improvements are preliminarily designed to be bridged. However, until the preferred alternative is selected and design has been determined, the actual impact area is not known.

*Attach associated file of EMST output (Mapper Report or other Excel File which includes MOU Type, Ecosystem Name, Common/Vegetation Type Name) in ECOS

Excel File Name:

District_12_EMST_Project_Area_only.xlsx

- 7.1 Yes Is there a discrepancy between actual habitat(s) and EMST mapped habitat(s)?

*Explanation:

Project is located within a highly urbanized area of Houston. Areas were reviewed using aerial photographs and site visits.

Attach file showing discrepancy between actual and EMST mapped habitat(s).

File Name:

Changes.xlsx

Is TPWD Coordination Required?

Yes

☒ Early Coordination

☐ Administrated Coordination - Must be conducted through ENV-NRM

BMPs Implemented or EPICs included (as necessary):



Biological Evaluation Form

TxDOT Contact Information

Name:

Phone Number:

E-mail:



Findings

Endangered Species Act (ESA)

No suitable habitat was observed for any federally listed species. Therefore, there would be no effect on federally listed species. However, measures to avoid harm to any threatened and endangered species would be taken should they be observed during construction of the proposed project. Coordination with the USFWS would not be required. The USFWS IPaC website was accessed on September 22, 2015.

Essential Fish Habitat (EFH)

Essential fish habitat is defined by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. Essential fish habitat is not present in the project action area. Coordination with National Marine Fisheries Service (NMFS) is not required.

Coastal Barrier Resources Act (CBRA)

The Coastal Barrier Resources Act (CBRA) established the Coastal Barrier Resources System to protect a defined set of geographic units along the coast of the U.S.

This project is not located within a designated CBRA map unit. Coordination with the U.S. Fish and Wildlife Service (USFWS) is not required.

Marine Mammal Protection Act (MMPA)

Marine mammals are protected under the Marine Mammal Protection Act (MMPA). The Texas coast provides suitable habitat and is within range of several marine mammals including the West Indian Manatee (*Trichechus manatus*), and bottlenose dolphin (*Tursiops truncatus*).

The project action area contains suitable habitat for marine mammals. Based on the nature of the proposed work, this project is unlikely to adversely affect marine mammals. Coordination with NMFS is not required.

USFWS indicates that West Indian manatee may be found in Harris County, but it is highly unlikely that the manatee would be found this far up Buffalo Bayou or White Oak Bayou because of lack of habitat.

Migratory Bird Treaty Act (MBTA)

The Migratory Bird Treaty Act (MBTA) states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations.

A site survey did not identify active nests within the project action area. TxDOT will take all appropriate actions to prevent the take of migratory birds, their active nests, eggs, or young by the use of proper phasing of the project or other appropriate actions.

A MBTA appropriate EPIC will be included in the project file.

Bald and Golden Eagle Protection Act (BGEPA)

The proposed project does not have the potential to impact Bald or Golden Eagles.



Fish and Wildlife Coordination Act (FWCA)

The Fish and Wildlife Coordination Act (FWCA) of 1958 requires that federal agencies obtain comments from USFWS and TPWD. This coordination is required whenever a project involves impounding, diverting, or deepening a stream channel or other body of water.

The proposed project is authorized under Section 404 of the Clean Water Act Nationwide Permit and Individual Permit; coordination under FWCA is addressed during the permitting process with the USACE.

Executive Order 13112 on Invasive Species (EO 13112)

Re-vegetation of disturbed areas would be in compliance with the Executive Order on Invasive Species (EO 13112). Regionally native and non-invasive plants will be used to the extent practicable in landscaping and re-vegetation.

Farmland Protection Policy Act (FPPA)

Coordination with the National Resources Conservation Service (NRCS) for FPPA would not be required because the project is not located in areas mapped as prime, unique, statewide or locally important nor is it located in an "urbanized area" identified by the NRCS Web Soil Survey or Census Bureau.

Signatures:

 No Was this form completed by TxDOT environmental staff?

Prepared By: Timothy Love

Title: Environmental Scientist

Love, Timothy

Digitally signed by Love, Timothy
Date: 2017.01.27 12:13:45 -06'00'

Date: January 27, 2017

Signature

TxDOT Reviewer: _____

Title: _____

Date: _____

Signature



Suggested Attachments

Aerial Map (with delineated project boundaries)

USFWS T&E List

TPWD T&E List

Species Impact Table

NDD EOID List and Tracked Managed Areas (Required for TPWD Coordination)

NOAA EFH Mapper Printout

USFWS CBRA Mapper Printout

EMST Project MOU Summary Table (Required for TPWD Coordination)

TPWD SGCN List

FPPA Documentation

NRCS Web Soil Survey Map

Census Bureau Urbanized Area Map

Landscaping Plans

Photos (Required for TPWD Coordination)

Previous TPWD Coordination Documentation (if applicable)



Biological Evaluation Form

The following table shows the revision history for this guidance document.

Revision History	
Effective Date Month, Year	Reason for and Description of Change
May 2014	Version 1 released.
August 2015	<p>Version 2 released.</p> <p>Revised the overall appearance to be more consistent with a form.</p> <p>Upgraded the District and County selection fields for increased simplicity.</p> <p>Included the NEPA Assignment MOU language for projects that are assigned to TxDOT under the NEPA Assignment MOU.</p> <p>Revised the Endangered Species Act to distinguish between take/no take and affect based on the project having or not having a federal nexus.</p> <p>Updated the Farmland Protection Policy Act questions to be more consistent with the applicable regulations.</p>

IPaC Trust Resource Report

Generated September 23, 2015 08:14 AM MDT

This report is for informational purposes only and should not be used for planning or analyzing project-level impacts. For projects that require FWS review, please return to this project on the IPaC website and request an official species list from the Regulatory Documents page.



US Fish & Wildlife Service

IPaC Trust Resource Report



Project Description

NAME

I 45

PROJECT CODE

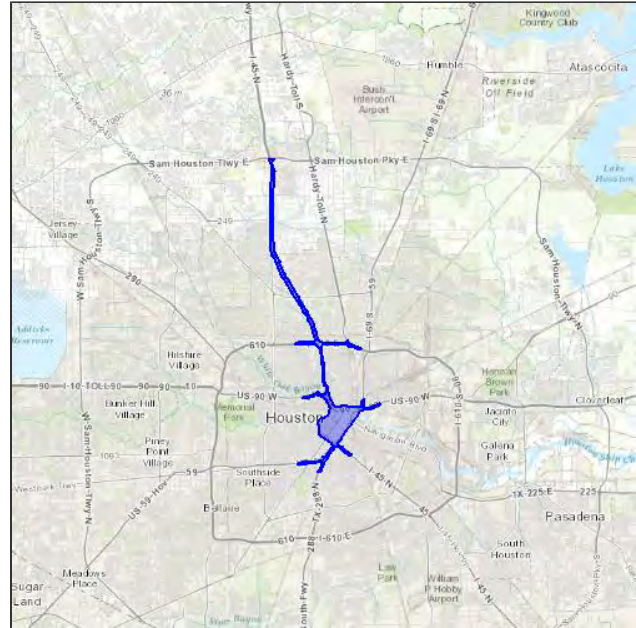
UOD5D-Q35YN-FLZNU-QJJEZ-UL4VSA

LOCATION

Harris County, Texas

DESCRIPTION

Beltway 8 to US59/I 69 US 288
Interchange



U.S. Fish & Wildlife Contact Information

Species in this report are managed by:

Texas Coastal Ecological Services Field Office

17629 El Camino Real, Suite 211

Houston, TX 77058-3051

(281) 286-8282

Endangered Species

Proposed, candidate, threatened, and endangered species that are managed by the [Endangered Species Program](#) and should be considered as part of an effect analysis for this project.

This unofficial species list is for informational purposes only and does not fulfill the requirements under [Section 7](#) of the Endangered Species Act, which states that Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action." This requirement applies to projects which are conducted, permitted or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can be obtained by returning to this project on the IPaC website and requesting an official species list on the Regulatory Documents page.

Birds

Least Tern *Sterna antillarum*

Endangered

THIS SPECIES ONLY NEEDS TO BE CONSIDERED IF THE FOLLOWING CONDITION APPLIES

Wind related projects within migratory route.

CRITICAL HABITAT

No critical habitat has been designated for this species.

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=B07N>

Piping Plover *Charadrius melodus*

Threatened

THIS SPECIES ONLY NEEDS TO BE CONSIDERED IF THE FOLLOWING CONDITION APPLIES

Wind related projects within migratory route.

CRITICAL HABITAT

No critical habitat has been designated for this species.

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=B079>

Red Knot *Calidris canutus rufa*

Threatened

THIS SPECIES ONLY NEEDS TO BE CONSIDERED IF THE FOLLOWING CONDITION APPLIES

Wind related projects within migratory route.

CRITICAL HABITAT

No critical habitat has been designated for this species.

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=B0DM>

Sprague's Pipit *Anthus spragueii*

Candidate

CRITICAL HABITAT

No critical habitat has been designated for this species.

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=B0GD>

Flowering Plants

Texas Prairie Dawn-flower *Hymenoxys texana*

Endangered

CRITICAL HABITAT

No critical habitat has been designated for this species.

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q2RK>

Mammals

West Indian Manatee *Trichechus manatus*

Endangered

CRITICAL HABITAT

There is **final** critical habitat designated for this species.

<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A007>

Critical Habitats

Potential effects to critical habitat(s) within the project area must be analyzed along with the endangered species themselves.

There is no critical habitat within this project area

Migratory Birds

Birds are protected by the [Migratory Bird Treaty Act](#) and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service ([1](#)). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

You are responsible for complying with the appropriate regulations for the protection of birds as part of this project. This involves analyzing potential impacts and implementing appropriate conservation measures for all project activities.

American Kestrel <i>Falco sparverius paulus</i> Year-round	Bird of conservation concern
American Oystercatcher <i>Haematopus palliatus</i> Year-round https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0G8	Bird of conservation concern
Bald Eagle <i>Haliaeetus leucocephalus</i> Year-round https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B008	Bird of conservation concern
Bewick's Wren <i>Thryomanes bewickii</i> ssp. <i>bewickii</i> Season: Wintering	Bird of conservation concern
Black Rail <i>Laterallus jamaicensis</i> Year-round https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B09A	Bird of conservation concern
Dickcissel <i>Spiza americana</i> Season: Breeding	Bird of conservation concern
Fox Sparrow <i>Passerella iliaca</i> Season: Wintering	Bird of conservation concern
Harris's Sparrow <i>Zonotrichia querula</i> Season: Wintering	Bird of conservation concern
Henslow's Sparrow <i>Ammodramus henslowii</i> Season: Wintering https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B09D	Bird of conservation concern
Hudsonian Godwit <i>Limosa haemastica</i> Season: Migrating	Bird of conservation concern
Lark Bunting <i>Calamospiza melanocorys</i> Season: Wintering	Bird of conservation concern
Le Conte's Sparrow <i>Ammodramus leconteii</i> Season: Wintering	Bird of conservation concern
Least Bittern <i>Ixobrychus exilis</i> Season: Breeding	Bird of conservation concern
Lesser Yellowlegs <i>Tringa flavipes</i> Season: Wintering	Bird of conservation concern

Little Blue Heron <i>Egretta caerulea</i> Season: Breeding	Bird of conservation concern
Loggerhead Shrike <i>Lanius ludovicianus</i> Year-round https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FY	Bird of conservation concern
Long-billed Curlew <i>Numenius americanus</i> Season: Wintering https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06S	Bird of conservation concern
Marbled Godwit <i>Limosa fedoa</i> Season: Wintering https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JL	Bird of conservation concern
Mississippi Kite <i>Ictinia mississippiensis</i> Season: Breeding	Bird of conservation concern
Nelson's Sparrow <i>Ammodramus nelsoni</i> Season: Wintering	Bird of conservation concern
Orchard Oriole <i>Icterus spurius</i> Season: Breeding	Bird of conservation concern
Painted Bunting <i>Passerina ciris</i> Season: Breeding	Bird of conservation concern
Peregrine Falcon <i>Falco peregrinus</i> Season: Wintering https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FU	Bird of conservation concern
Prothonotary Warbler <i>Protonotaria citrea</i> Season: Breeding	Bird of conservation concern
Red Knot <i>Calidris canutus rufa</i> Season: Wintering https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0DM	Bird of conservation concern
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> Year-round	Bird of conservation concern
Rusty Blackbird <i>Euphagus carolinus</i> Season: Wintering	Bird of conservation concern
Sedge Wren <i>Cistothorus platensis</i> Season: Wintering	Bird of conservation concern
Short-billed Dowitcher <i>Limnodromus griseus</i> Season: Wintering	Bird of conservation concern
Short-eared Owl <i>Asio flammeus</i> Season: Wintering https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HD	Bird of conservation concern
Snowy Plover <i>Charadrius alexandrinus</i> Season: Breeding	Bird of conservation concern
Swainson's Warbler <i>Limnothlypis swainsonii</i> Season: Breeding	Bird of conservation concern
Whimbrel <i>Numenius phaeopus</i> Season: Wintering https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0JN	Bird of conservation concern

Worm Eating Warbler *Helminthos vermivorum*

Season: Migrating

Bird of conservation concern**Yellow Rail** *Coturnicops noveboracensis*

Season: Wintering

Bird of conservation concern<https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?sPCODE=B0JG>

Refuges

Any activity proposed on [National Wildlife Refuge](#) lands must undergo a 'Compatibility Determination' conducted by the Refuge. If your project overlaps or otherwise impacts a Refuge, please contact that Refuge to discuss the authorization process.

There are no refuges within this project area

Wetlands

Impacts to [NWI wetlands](#) and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes.

Project proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate [U.S. Army Corps of Engineers District](#).

DATA LIMITATIONS

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

DATA EXCLUSIONS

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tubercid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

DATA PRECAUTIONS

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

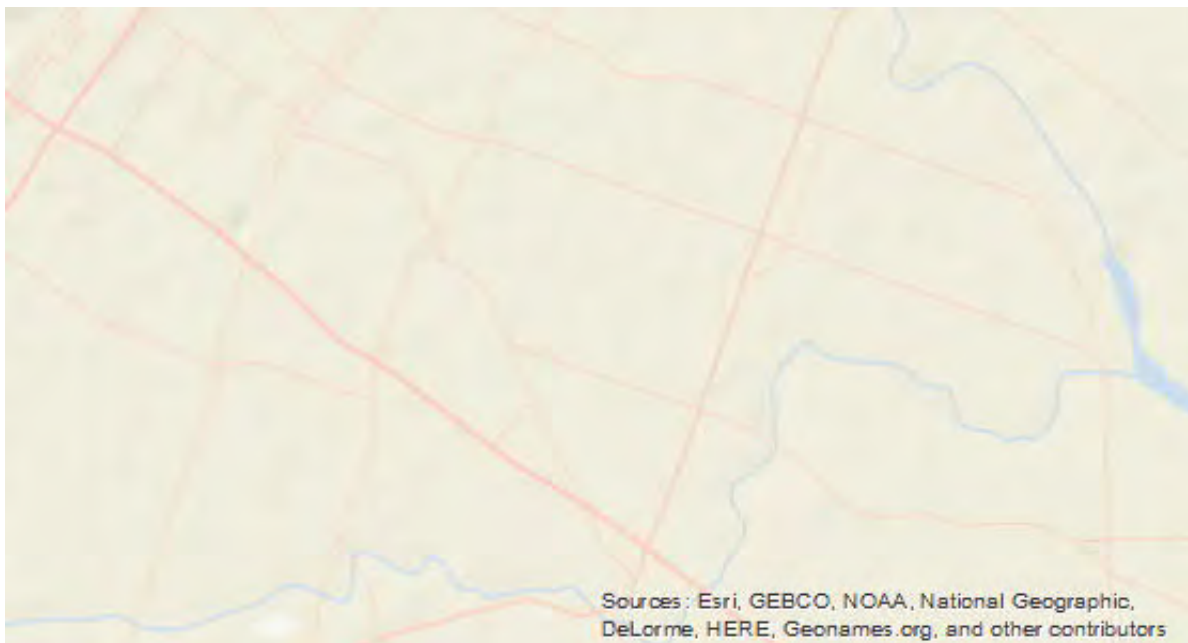
Freshwater Pond

PUBFx	0.196 acre
PUBHx	0.165 acre

Riverine

R2UBH	164.0 acres
R2UBHx	17.9 acres

EFH Data Notice: Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional Fishery Management Councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.



Query Results

Map Scale = 1:72,224

Degrees, Minutes, Seconds: Latitude = 29°45'45" N, Longitude = 96°38'48" W

Decimal Degrees: Latitude = 29.76, Longitude = -95.35

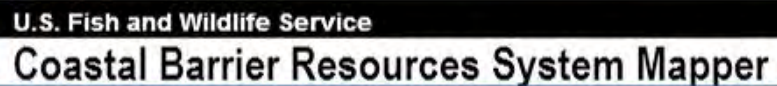
The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.



Zoom History



Measure

Streets

Imagery/Labels

Topo

USGS Topo



Enter address or zip code...

Find Location

CBRS

Enter CBS unit number (e.g., Q01P)

Find CBRS

Available Layers

☒ CBRS Units

CBRS Units

☐ Otherwise Protected Area

System Unit



United States
Department of
Agriculture

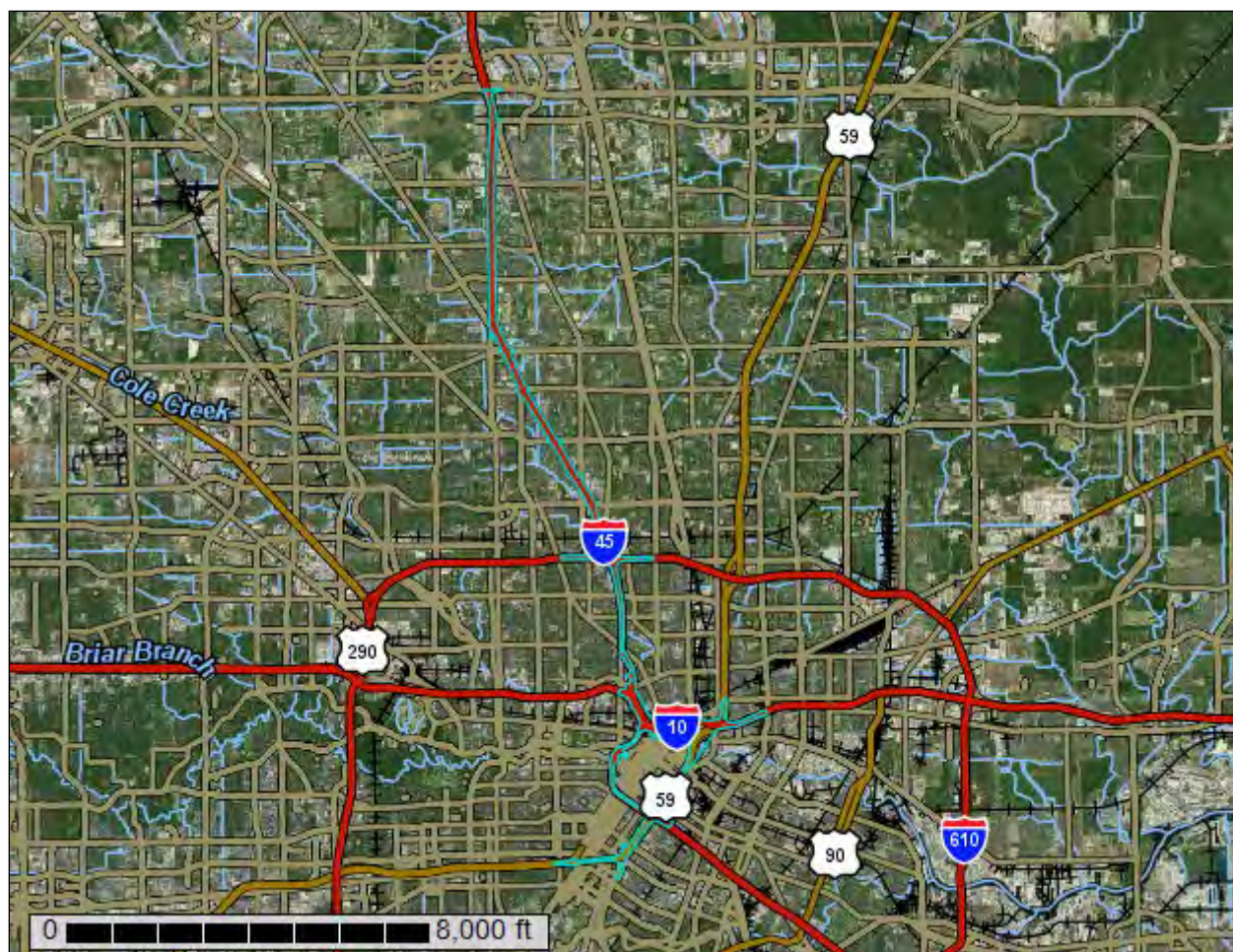
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Harris County, Texas**

North Houston Highway Improvement Project



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

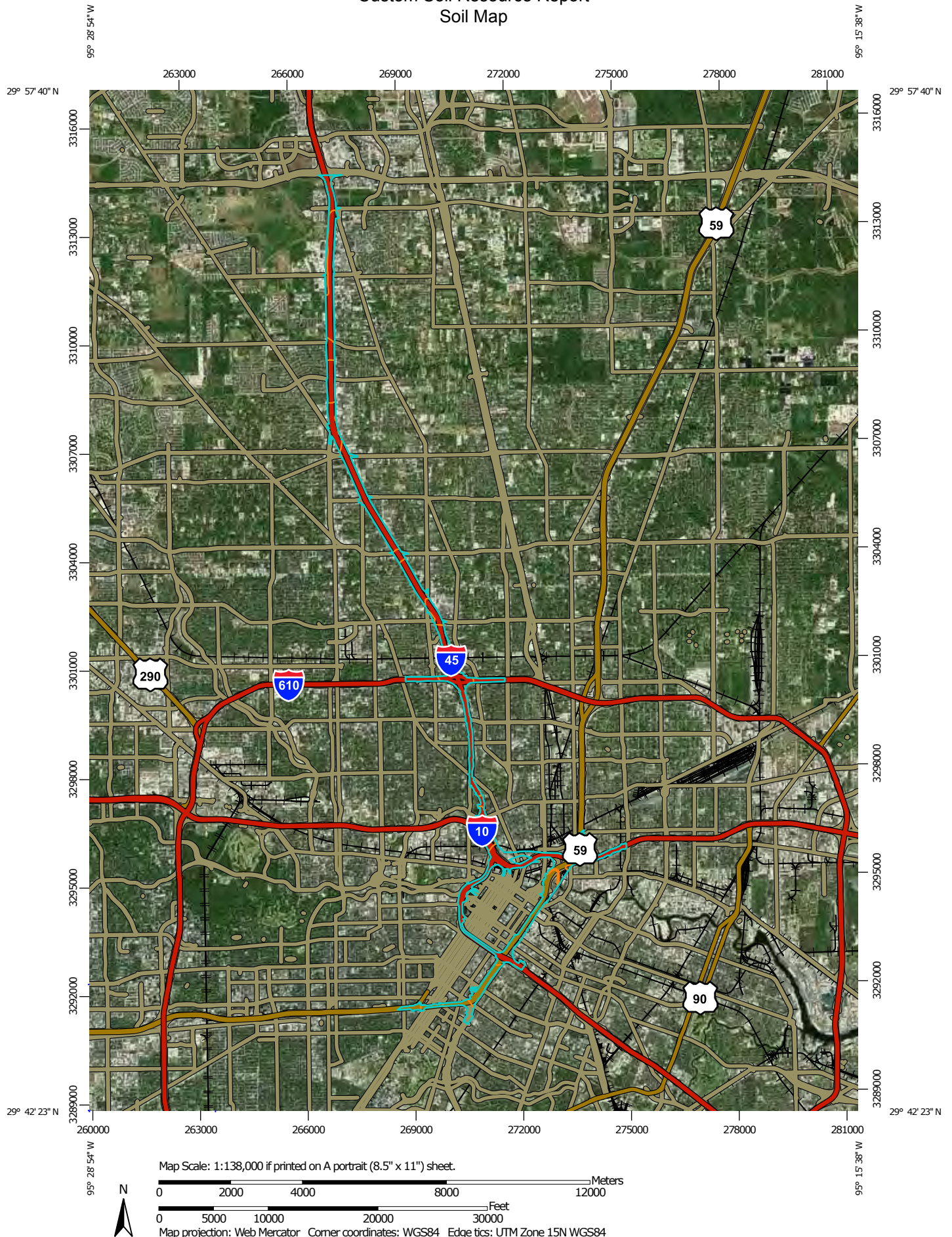
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


Custom Soil Resource Report Soil Map



Custom Soil Resource Report


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)


Soils


 Soil Map Unit Polygons


 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit


 Clay Spot


 Closed Depression

 Gravel Pit

 Gravelly Spot


 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water


 Perennial Water

 Rock Outcrop


 Saline Spot

 Sandy Spot

 Severely Eroded Spot


 Sinkhole


 Slide or Slip

 Sodic Spot


 Spoil Area

 Stony Spot


 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals


Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Harris County, Texas
Survey Area Data: Version 14, Sep 30, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 5, 2011—Feb 9, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Harris County, Texas (TX201)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Ak	Addicks-Urban land complex	207.9	11.6%
As	Aris-Urban land complex	80.1	4.5%
BadA	Bacliff-Urban land complex, 0 to 1 percent slopes	61.8	3.5%
Bg	Bernard-Urban land complex	117.9	6.6%
Cd	Clodine fine sandy loam, 0 to 1 percent slopes	67.1	3.7%
Ce	Clodine-Urban land complex	308.1	17.2%
Gu	Gessner-Urban land complex	219.3	12.3%
Mu	Verland-Urban land complex	63.6	3.6%
TeuB	Texla-Urban land complex, 0 to 2 percent slopes	9.6	0.5%
URLX	Urban land	554.7	31.0%
VauA	Vamont-Urban land complex, 0 to 1 percent slopes	92.6	5.2%
W	Water	7.4	0.4%
Totals for Area of Interest		1,790.0	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally

are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Harris County, Texas

Ak—Addicks-Urban land complex

Map Unit Setting

National map unit symbol: db8g
Elevation: 0 to 4,000 feet
Mean annual precipitation: 8 to 60 inches
Mean annual air temperature: 54 to 73 degrees F
Frost-free period: 180 to 310 days
Farmland classification: Not prime farmland

Map Unit Composition

Addicks and similar soils: 55 percent
Urban land: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Addicks

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits of early pleistocene age

Typical profile

H1 - 0 to 11 inches: loam
H2 - 11 to 49 inches: loam
H3 - 49 to 78 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: About 12 to 21 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: High (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Ecological site: Loamy Prairie 44-56" PZ (R150AY741TX)

Description of Urban Land

Typical profile

H1 - 0 to 40 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydrologic Soil Group: D

Minor Components

Unnamed

Percent of map unit: 5 percent

As—Aris-Urban land complex

Map Unit Setting

National map unit symbol: db8m

Elevation: 0 to 4,000 feet

Mean annual precipitation: 8 to 60 inches

Mean annual air temperature: 54 to 73 degrees F

Frost-free period: 180 to 335 days

Farmland classification: Not prime farmland

Map Unit Composition

Aris and similar soils: 55 percent

Urban land: 35 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aris

Setting

Landform: Flats

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy fluviomarine deposits of late pleistocene age

Typical profile

H1 - 0 to 21 inches: fine sandy loam

H2 - 21 to 28 inches: sandy clay loam

H3 - 28 to 60 inches: clay

H4 - 60 to 78 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Poorly drained

Custom Soil Resource Report

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 3 percent

Gypsum, maximum in profile: 3 percent

Sodium adsorption ratio, maximum in profile: 4.0

Available water storage in profile: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: C

Ecological site: Loamy Prairie 44-56" PZ (R150AY741TX)

Description of Urban Land

Typical profile

H1 - 0 to 40 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydrologic Soil Group: D

Minor Components

Unnamed

Percent of map unit: 10 percent

BadA—Bacliff-Urban land complex, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2syfl

Elevation: 10 to 100 feet

Mean annual precipitation: 43 to 49 inches

Mean annual air temperature: 68 to 72 degrees F

Frost-free period: 270 to 300 days

Map Unit Composition

Bacliff and similar soils: 65 percent

Urban land: 35 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bacliff

Setting

Landform: Depressions

Custom Soil Resource Report

Landform position (three-dimensional): Dip

Microfeatures of landform position: Gilgai

Down-slope shape: Linear

Across-slope shape: Concave

Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: clay

Bg - 9 to 35 inches: clay

Bssg - 35 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 11 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 2 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 2.0

Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: D

Ecological site: Blackland 24-44" PZ (R150AY526TX)

Description of Urban Land

Setting

Down-slope shape: Linear

Across-slope shape: Linear

Typical profile

M - 0 to 40 inches: variable

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

Bg—Bernard-Urban land complex

Map Unit Setting

National map unit symbol: db8t
Elevation: 0 to 4,000 feet
Mean annual precipitation: 8 to 60 inches
Mean annual air temperature: 54 to 73 degrees F
Frost-free period: 180 to 310 days
Farmland classification: Not prime farmland

Map Unit Composition

Bernard and similar soils: 55 percent
Urban land: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bernard

Setting

Landform: Meander scrolls
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits of late pleistocene age

Typical profile

H1 - 0 to 6 inches: clay loam
H2 - 6 to 34 inches: clay
H3 - 34 to 65 inches: clay

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): 2w
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: Blackland 24-44" PZ (R150AY526TX)

Description of Urban Land

Typical profile

H1 - 0 to 40 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydrologic Soil Group: D

Minor Components

Unnamed

Percent of map unit: 10 percent

Cd—Clodine fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: nrwb

Elevation: 100 to 230 feet

Mean annual precipitation: 43 to 49 inches

Mean annual air temperature: 68 to 70 degrees F

Frost-free period: 270 to 300 days

Farmland classification: Not prime farmland

Map Unit Composition

Clodine and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clodine

Setting

Landform: Flats

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Concave

Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 9 inches: fine sandy loam

Bt1 - 9 to 23 inches: loam

Bt2 - 23 to 57 inches: loam

Bt3 - 57 to 80 inches: loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat poorly drained

Custom Soil Resource Report

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)

Depth to water table: About 0 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 1 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 12.0

Available water storage in profile: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: C/D

Ecological site: Lowland 35-56" PZ (R150AY537TX)

Minor Components

Katy

Percent of map unit: 10 percent

Landform: Flats

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Convex

Ecological site: Loamy Prairie 44-56" PZ (R150AY741TX)

Gessner

Percent of map unit: 5 percent

Landform: Depressions

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Concave

Ecological site: Lowland 35-56" PZ (R150AY537TX)

Ce—Clodine-Urban land complex

Map Unit Setting

National map unit symbol: db8y

Elevation: 0 to 4,000 feet

Mean annual precipitation: 8 to 60 inches

Mean annual air temperature: 54 to 73 degrees F

Frost-free period: 180 to 310 days

Farmland classification: Not prime farmland

Map Unit Composition

Clodine and similar soils: 55 percent

Urban land: 35 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clodine

Setting

Landform: Flats

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy fluviomarine deposits of early pleistocene age

Typical profile

H1 - 0 to 12 inches: loam

H2 - 12 to 29 inches: loam

H3 - 29 to 72 inches: loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Poorly drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: About 0 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0
mmhos/cm)

Sodium adsorption ratio, maximum in profile: 2.0

Available water storage in profile: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: B/D

Ecological site: Lowland 35-56" PZ (R150AY537TX)

Description of Urban Land

Typical profile

H1 - 0 to 40 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydrologic Soil Group: D

Minor Components

Unnamed

Percent of map unit: 10 percent

Gu—Gessner-Urban land complex

Map Unit Setting

National map unit symbol: db92
Elevation: 0 to 4,000 feet
Mean annual precipitation: 8 to 60 inches
Mean annual air temperature: 54 to 73 degrees F
Frost-free period: 180 to 310 days
Farmland classification: Not prime farmland

Map Unit Composition

Gessner and similar soils: 55 percent
Urban land: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gessner

Setting

Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy fluviomarine deposits of early pleistocene age

Typical profile

H1 - 0 to 16 inches: loam
H2 - 16 to 80 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: Lowland 35-56" PZ (R150AY537TX)

Description of Urban Land

Typical profile

H1 - 0 to 40 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydrologic Soil Group: D

Minor Components

Unnamed

Percent of map unit: 10 percent

Mu—Verland-Urban land complex

Map Unit Setting

National map unit symbol: db9j

Elevation: 0 to 4,000 feet

Mean annual precipitation: 8 to 60 inches

Mean annual air temperature: 54 to 73 degrees F

Frost-free period: 180 to 335 days

Farmland classification: Not prime farmland

Map Unit Composition

Verland and similar soils: 50 percent

Urban land: 35 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Verland

Setting

Landform: Meander scrolls

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy fluviomarine deposits of late pleistocene age

Typical profile

H1 - 0 to 7 inches: silty clay loam

H2 - 7 to 20 inches: clay

H3 - 20 to 72 inches: clay

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat poorly drained

Runoff class: High

Custom Soil Resource Report

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 6 to 18 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 3 percent

Available water storage in profile: High (about 10.9 inches)

Interpretive groups

Land capability classification (irrigated): 3w

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: D

Ecological site: Blackland 24-44" PZ (R150AY526TX)

Description of Urban Land

Typical profile

H1 - 0 to 40 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydrologic Soil Group: D

Minor Components

Unnamed

Percent of map unit: 15 percent

TeuB—Texla-Urban land complex, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2syf8

Elevation: 20 to 100 feet

Mean annual precipitation: 48 to 60 inches

Mean annual air temperature: 67 to 69 degrees F

Frost-free period: 240 to 300 days

Map Unit Composition

Texla and similar soils: 65 percent

Urban land: 35 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Texla

Setting

Landform: Flats

Landform position (three-dimensional): Rise

Microfeatures of landform position: Bars

Down-slope shape: Linear

Custom Soil Resource Report

Across-slope shape: Convex

Parent material: Loamy fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 4 inches: silt loam

E - 4 to 14 inches: silt loam

Bt/E - 14 to 24 inches: silt loam

Bt - 24 to 65 inches: silty clay loam

Btg - 65 to 80 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat poorly drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 6 to 18 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 1 percent

Gypsum, maximum in profile: 1 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 3.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 13.0

Available water storage in profile: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: D

Other vegetative classification: Unnamed (G152BT000TX)

Description of Urban Land

Setting

Down-slope shape: Linear

Across-slope shape: Linear

Typical profile

M - 0 to 40 inches: variable

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

URLX—Urban land

Map Unit Setting

National map unit symbol: 2sych

Elevation: 10 to 200 feet

Mean annual precipitation: 48 to 62 inches

Mean annual air temperature: 67 to 72 degrees F

Frost-free period: 240 to 300 days

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Down-slope shape: Linear

Across-slope shape: Linear

Typical profile

M - 0 to 40 inches: variable

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

VauA—Vamont-Urban land complex, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2syf7

Elevation: 10 to 200 feet

Mean annual precipitation: 48 to 60 inches

Mean annual air temperature: 67 to 69 degrees F

Frost-free period: 240 to 300 days

Map Unit Composition

Vamont and similar soils: 65 percent

Urban land: 35 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Vamont

Setting

Landform: Flats

Landform position (three-dimensional): Talf

Microfeatures of landform position: Gilgai

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Clayey fluviomarine deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

A - 0 to 4 inches: silty clay

Bss - 4 to 20 inches: clay

Bssg1 - 20 to 60 inches: clay

Bssg2 - 60 to 80 inches: clay

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat poorly drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: About 14 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 4.0

Available water storage in profile: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: C/D

Description of Urban Land

Setting

Down-slope shape: Linear

Across-slope shape: Linear

Typical profile

M - 0 to 40 inches: variable

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: 0 inches to manufactured layer

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)

W—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

Hydric Rating by Map Unit (North Houston Highway Improvement Project)

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

Custom Soil Resource Report

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

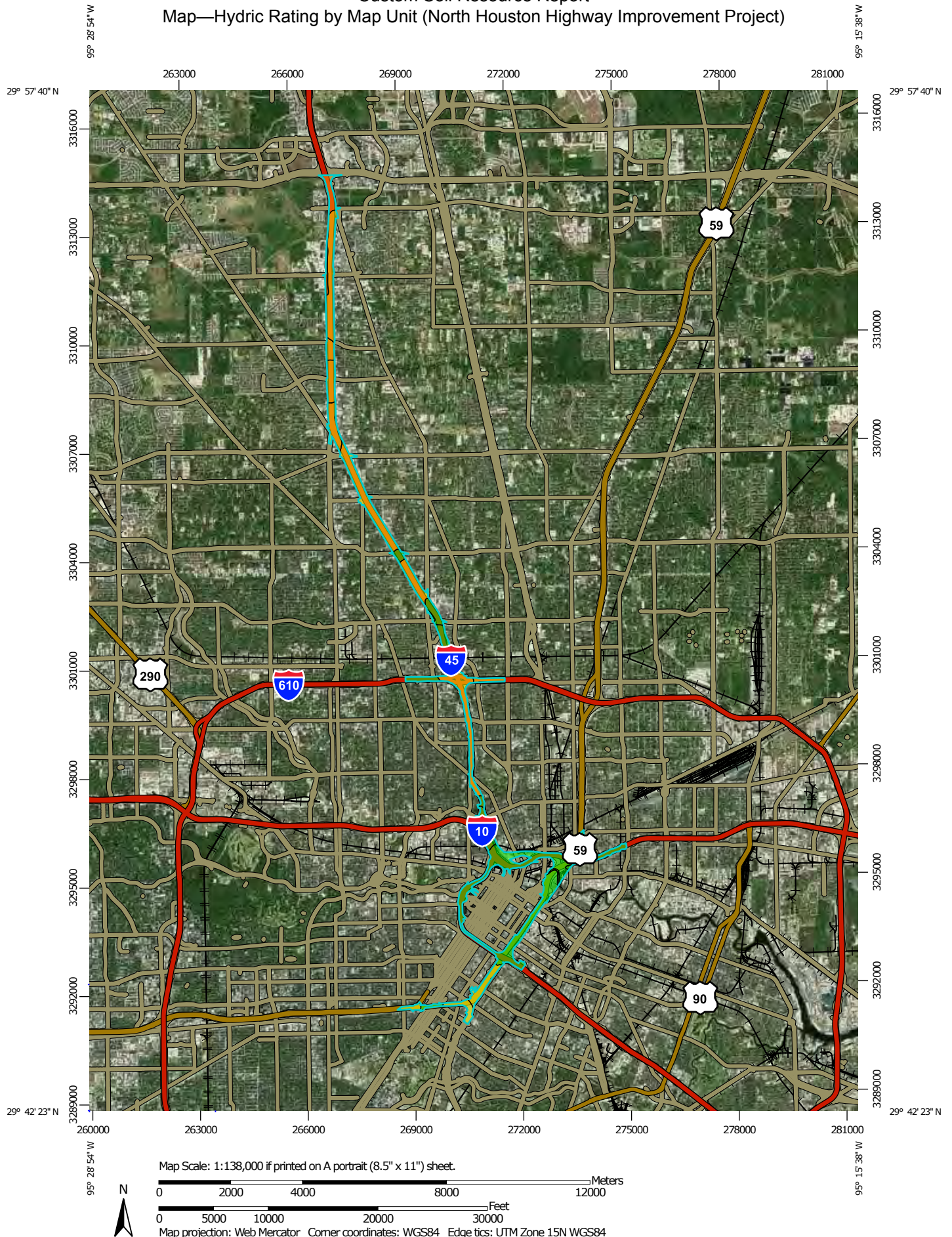
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Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.


Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Custom Soil Resource Report
Map—Hydric Rating by Map Unit (North Houston Highway Improvement Project)









MAP LEGEND

Area of Interest (AOI)







 Area of Interest (AOI)

Soils







Soil Rating Polygons

 Hydric (100%)
 Hydric (66 to 99%)
 Hydric (33 to 65%)
 Hydric (1 to 32%)
 Not Hydric (0%)
 Not rated or not available


Soil Rating Lines

 Hydric (100%)
 Hydric (66 to 99%)
 Hydric (33 to 65%)
 Hydric (1 to 32%)
 Not Hydric (0%)
 Not rated or not available






Soil Rating Points

 Hydric (100%)
 Hydric (66 to 99%)
 Hydric (33 to 65%)
 Hydric (1 to 32%)
 Not Hydric (0%)
 Not rated or not available

Water Features

 Streams and Canals

Transportation

 Rails
 Interstate Highways
 US Routes
 Major Roads
 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Harris County, Texas
 Survey Area Data: Version 14, Sep 30, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 5, 2011—Feb 9, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydric Rating by Map Unit (North Houston Highway Improvement Project)

Hydric Rating by Map Unit— Summary by Map Unit — Harris County, Texas (TX201)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Ak	Addicks-Urban land complex	55	207.9	11.6%
As	Aris-Urban land complex	55	80.1	4.5%
BadA	Bacliff-Urban land complex, 0 to 1 percent slopes	65	61.8	3.5%
Bg	Bernard-Urban land complex	0	117.9	6.6%
Cd	Clodine fine sandy loam, 0 to 1 percent slopes	90	67.1	3.7%
Ce	Clodine-Urban land complex	55	308.1	17.2%
Gu	Gessner-Urban land complex	55	219.3	12.3%
Mu	Verland-Urban land complex	0	63.6	3.6%
TeuB	Texla-Urban land complex, 0 to 2 percent slopes	0	9.6	0.5%
URLX	Urban land	0	554.7	31.0%
VauA	Vamont-Urban land complex, 0 to 1 percent slopes	0	92.6	5.2%
W	Water	0	7.4	0.4%
Totals for Area of Interest			1,790.0	100.0%

Rating Options—Hydric Rating by Map Unit (North Houston Highway Improvement Project)

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

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United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

HARRIS COUNTY

AMPHIBIANS

		Federal Status	State Status
Houston toad	<i>Anaxyrus houstonensis</i>	LE	E

endemic; sandy substrate, water in pools, ephemeral pools, stock tanks; breeds in spring especially after rains; burrows in soil of adjacent uplands when inactive; breeds February-June; associated with soils of the Sparta, Carrizo, Goliad, Queen City, Recklaw, Weches, and Willis geologic formations

Southern Crawfish Frog	<i>Lithobates areolatus areolatus</i>
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The Southern Crawfish Frog can be found in abandoned crawfish holes and small mammal burrows. This species inhabits moist meadows, pasturelands, pine scrub, and river flood plains. This species spends nearly all of its time in burrows and only leaves the burrow area to breed. Although this species can be difficult to detect due to its reclusive nature, the call of breeding males can be heard over great distances. Eggs are laid and larvae develop in temporary water such as flooded fields, ditches, farm ponds and small lakes. Habitat: Shallow water, Herbaceous Wetland, Riparian, Temporary Pool, Cropland/hedgerow, Grassland/herbaceous, Suburban/orchard, Woodland – Conifer.

BIRDS

		Federal Status	State Status
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	DL	T

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.

Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	DL
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migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.

Bald Eagle	<i>Haliaeetus leucocephalus</i>	DL	T
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found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds

Black Rail	<i>Laterallus jamaicensis</i>
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salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous year's dead grasses; nest usually hidden in marsh grass or at base of Salicornia

Brown Pelican	<i>Pelecanus occidentalis</i>	DL
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largely coastal and near shore areas, where it roosts and nests on islands and spoil banks

Henslow's Sparrow	<i>Ammodramus henslowii</i>
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wintering individuals (not flocks) found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles; a key component is bare ground for running/walking

HARRIS COUNTY

BIRDS

		Federal Status	State Status
Mountain Plover	<i>Charadrius montanus</i>		
breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous			
Peregrine Falcon	<i>Falco peregrinus</i>	DL	T
both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F. p. anatum) is also a resident breeder in west Texas; the two subspecies' listing statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat.			
Red-cockaded Woodpecker	<i>Picoides borealis</i>	LE	E
cavity nests in older pine (60+ years); forages in younger pine (30+ years); prefers longleaf, shortleaf, and loblolly			
Snowy Plover	<i>Charadrius alexandrinus</i>		
formerly an uncommon breeder in the Panhandle; potential migrant; winter along coast			
Southeastern Snowy Plover	<i>Charadrius alexandrinus tenuirostris</i>		
wintering migrant along the Texas Gulf Coast beaches and bayside mud or salt flats			
Sprague's Pipit	<i>Anthus spragueii</i>	C	
only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges.			
White-faced Ibis	<i>Plegadis chihi</i>		T
prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats			
White-tailed Hawk	<i>Buteo albicaudatus</i>		T
near coast on prairies, cordgrass flats, and scrub-live oak; further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral; breeding March-May			
Whooping Crane	<i>Grus americana</i>	LE	E
potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties			
Wood Stork	<i>Mycteria americana</i>		T
forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960			

HARRIS COUNTY

FISHES

Federal Status

State Status

American eel

Anguilla rostrata

coastal waterways below reservoirs to gulf; spawns January to February in ocean, larva move to coastal waters, metamorphose, then females move into freshwater; most aquatic habitats with access to ocean, muddy bottoms, still waters, large streams, lakes; can travel overland in wet areas; males in brackish estuaries; diet varies widely, geographically, and seasonally

Creek chubsucker

Erimyzon oblongus

T

tributaries of the Red, Sabine, Neches, Trinity, and San Jacinto rivers; small rivers and creeks of various types; seldom in impoundments; prefers headwaters, but seldom occurs in springs; young typically in headwater rivulets or marshes; spawns in river mouths or pools, riffles, lake outlets, upstream creeks

Smalltooth sawfish

Pristis pectinata

LE

E

different life history stages have different patterns of habitat use; young found very close to shore in muddy and sandy bottoms, seldom descending to depths greater than 32 ft (10 m); in sheltered bays, on shallow banks, and in estuaries or river mouths; adult sawfish are encountered in various habitat types (mangrove, reef, seagrass, and coral), in varying salinity regimes and temperatures, and at various water depths, feed on a variety of fish species and crustaceans

MAMMALS

Federal Status

State Status

Louisiana black bear

Ursus americanus luteolus

LT

T

possible as transient; bottomland hardwoods and large tracts of inaccessible forested areas

Plains spotted skunk

Spilogale putorius interrupta

catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie

Rafinesque's big-eared bat

Corynorhinus rafinesquii

T

roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures

Red wolf

Canis rufus

LE

E

extirpated; formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies

Southeastern myotis bat

Myotis austroriparius

roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures

MOLLUSKS

Federal Status

State Status

Little spectaclecase

Villosa lienosa

creeks, rivers, and reservoirs, sandy substrates in slight to moderate current, usually along the banks in slower currents; east Texas, Cypress through San Jacinto River basins

Louisiana pigtoe

Pleurobema riddellii

T

streams and moderate-size rivers, usually flowing water on substrates of mud, sand, and gravel; not generally known from impoundments; Sabine, Neches, and Trinity (historic) River basins

HARRIS COUNTY

MOLLUSKS

		Federal Status	State Status
Sandbank pocketbook	<i>Lampsilis satura</i>		T
small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms; east Texas, Sulfur south through San Jacinto River basins; Neches River			
Texas pigtoe	<i>Fusconaia askewi</i>		T
rivers with mixed mud, sand, and fine gravel in protected areas associated with fallen trees or other structures; east Texas River basins, Sabine through Trinity rivers as well as San Jacinto River			
Wabash pigtoe	<i>Fusconaia flava</i>		
creeks to large rivers on mud, sand, and gravel from all habitats except deep shifting sands; found in moderate to swift current velocities; east Texas River basins, Red through San Jacinto River basins; elsewhere occurs in reservoirs and lakes with no flow			

REPTILES

		Federal Status	State Status
Alligator snapping turtle	<i>Macrochelys temminckii</i>		T
perennial water bodies; deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; sometimes enters brackish coastal waters; usually in water with mud bottom and abundant aquatic vegetation; may migrate several miles along rivers; active March-October; breeds April-October			
Green sea turtle	<i>Chelonia mydas</i>	LT	T
Gulf and bay system; shallow water seagrass beds, open water between feeding and nesting areas, barrier island beaches; adults are herbivorous feeding on sea grass and seaweed; juveniles are omnivorous feeding initially on marine invertebrates, then increasingly on sea grasses and seaweeds; nesting behavior extends from March to October, with peak activity in May and June			
Gulf Saltmarsh snake	<i>Nerodia clarkii</i>		
saline flats, coastal bays, and brackish river mouthss			
Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	LE	E
Gulf and bay system, adults stay within the shallow waters of the Gulf of Mexico; feed primarily on crabs, but also snails, clams, other crustaceans and plants, juveniles feed on sargassum and its associated fauna; nests April through August			
Leatherback sea turtle	<i>Dermochelys coriacea</i>	LE	E
Gulf and bay systems, and widest ranging open water reptile; omnivorous, shows a preference for jellyfish; in the US portion of their western Atlantic nesting territories, nesting season ranges from March to August			
Loggerhead sea turtle	<i>Caretta caretta</i>	LT	T
Gulf and bay system primarily for juveniles, adults are most pelagic of the sea turtles; omnivorous, shows a preference for mollusks, crustaceans, and coral; nests from April through November			
Texas horned lizard	<i>Phrynosoma cornutum</i>		T
open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September			

HARRIS COUNTY

REPTILES

		Federal Status	State Status
Timber rattlesnake	<i>Crotalus horridus</i>		T
swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto			

PLANTS

		Federal Status	State Status
Coastal gay-feather	<i>Liatris bracteata</i>		
Texas endemic; coastal prairie grasslands of various types, from salty prairie on low-lying somewhat saline clay loams to upland prairie on nonsaline clayey to sandy loams; flowering in fall			
Florida ladies-tresses	<i>Spiranthes brevilabris</i> var. <i>floridana</i>		
Moist to wet, relatively open sites of pine-dominated landscapes, mesic pine uplands, open scrub pinelands with saw palmetto, Catahoula sandstone barrens, meadows, open grassy lawns, pitcher plant and seepage bogs, wet prairies, wet savannahs, and flatwoods. Delicate, nearly ephemeral, orchid with winter rosette. Flowers Apr-May.			
Giant sharpstem umbrella-sedge	<i>Cyperus cephalanthus</i>		
in Texas on saturated, fine sandy loam soils, along nearly level fringes of deep prairie depressions; also in depressional area within coastal prairie remnant on heavy black clay; in Louisiana, most sites are coastal prairie on poorly drained sites, some on slightly elevated areas surrounded by standing shallow water, and on moderately drained sites; soils include very strongly acid to moderately alkaline silt loams and silty clay loams; flowering/fruiting May-June, August-September, and possibly other times in response to rainfall			
Houston daisy	<i>Rayjacksonia aurea</i>		
Texas endemic; on and around naturally barren or sparsely vegetated saline slick spots or pimple mounds on coastal prairies, usually on sandy to sandy loam soils, occasionally in pastures and on roadsides in similar soil types where mowing may mimic natural prairie disturbance regimes; flowering late September-November (-December)			
Neglected coneflower	<i>Echinacea paradoxa</i> var. <i>neglecta</i>		
Rocky prairies, glades, and crosstimer open woodlands and savannas. Full sun.			
Panicled indigobush	<i>Amorpha paniculata</i>		
A stout shrub, 3 m (9 ft) tall that grows in acid seep forests, peat bogs, wet floodplain forests, and seasonal wetlands on the edge of Saline Prairies in East Texas. It is distinguished from other <i>Amorpha</i> species by its fuzzy leaflets with prominent raised veins underneath, and the flower panicles, which are 8 to 16 inches long and slender, held above the foliage.			
Texas ladies'-tresses	<i>Spiranthes brevilabris</i> var. <i>brevilabris</i>		
Sandy soils in moist prairies, incl. blackland/Fleming prairies, calcareous prairie pockets surrounded by pines, pine-hardwood forest, open pinelands, wetland pine savannahs/flatwoods, and dry to moist fields, meadows, and roadsides. Delicate, nearly ephemeral orchid, producing winter rosettes, flowers Feb-Apr. Historically endemic to SE coastal plain.			

HARRIS COUNTY

PLANTS

Federal Status

State Status

Texas meadow-rue

Thalictrum texanum

Texas endemic; mostly found in woodlands and woodland margins on soils with a surface layer of sandy loam, but it also occurs on prairie pimple mounds; both on uplands and creek terraces, but perhaps most common on claypan savannas; soils are very moist during its active growing season; flowering/fruiting (January-)February-May, withering by midsummer, foliage reappears in late fall(November) and may persist through the winter

Texas prairie dawn

Hymenoxys texana

LE

E

Texas endemic; in poorly drained, sparsely vegetated areas (slick spots) at the base of mima mounds in open grassland or almost barren areas on slightly saline soils that are sticky when wet and powdery when dry; flowering late February-early April

Texas windmill-grass

Chloris texensis

Texas endemic; sandy to sandy loam soils in relatively bare areas in coastal prairie grassland remnants, often on roadsides where regular mowing may mimic natural prairie fire regimes; flowering in fall

Threeflower broomweed

Thurovia triflora

Texas endemic; near coast in sparse, low vegetation on a veneer of light colored silt or fine sand over saline clay along drier upper margins of ecotone between between salty prairies and tidal flats; further inland associated with vegetated slick spots on prairie mima mounds; flowering September-November

Element Occurrence Record

Scientific Name: Anaxyrus houstonensis

Occurrence #: 4

Eo Id: 3159

Common Name: Houston Toad

Track Status: Track all extant and selected historical EOs

TX Protection Status: E

Global Rank: G1

State Rank: S1

Federal Status: LE

Location Information:

Directions:

SOUTHEAST HOUSTON, NORTH OF CLEAR CREEK, WEST OF I-45, EAST OF TELEPHONE ROAD, SOUTHEAST AND SOUTH OF HOBBY AIRPORT. ALSO ELLINGTON AIR FORCE BASE.

Survey Information:

First Observation: 1953

Survey Date:

Last Observation: 1976

Eo Type:

Eo Rank: H

Eo Rank Date: 1984-01-01

Observed Area: 600.00

Comments:

General Description: SANDY SUBSTRATE, POOLS - EPHEMERAL & PERMANENT FRESH WATER. URBAN AREA, ENCROACHING URBANIZATION.

Comments: NOT A PROTECTABLE OCCURRENCE, NOT SEEN RECENTLY. URBANIZATION HAS PROBABLY ELIMINATED HABITAT.

Protection Comments: WORK WITH HRRS, BRZR CO. PARKS TO ENSURE HABITAT MAINTENANCE

Management Comments: REINTRODUCE IN PROTECTED HABITAT

Data:

EO Data: A NUMBER OBSERVED UNTIL MID 70'S. NEEDS SANDY SUBSTRATE AND EPHEMERAL RAIN POOLS TO BREED. BREEDS IN FEBRUARY. OCCASIONAL HYBRIDS WITH OTHER BUFO SPP. FACILITATED BY HABITAT MODIFICATION

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

BROWN, L.E., ET. AL., 1983. AGENCY REVIEW DRAFT OF THE RECOVERY PLAN FOR THE HOUSTON TOAD (BUFO HOUSTONENSIS). USF& WS, ALBUQUERQUE, NM. 48PP.

QUINN, HUGH R. AND GREG MENGDEN. 1984. REPRODUCTION AND GROWTH OF BUFO HOUSTONENSIS (BUFONIDAE). S.W. NAT. 29(2): 189-195.

BROWN, LAUREN E., 1971. NATURAL HYBRIDIZATION AND TREND TOWARD EXTINCTION IN SOME RELICT TEXAS TOAD POPULATIONS. SOUTHWESTERN NATURALIST 16(2):185-199.

QUINN, HUGH. NO DATE. CURATOR OF REPTILES HOUSTON ZOOLOGICAL GARDENS PARKS & RECREATION DEPARTMENT PH-713/520-3208.

Element Occurrence Record

Specimen:

Element Occurrence Record

Scientific Name: Chloris texensis

Occurrence #: 18

Eo Id: 1901

Common Name: Texas windmill grass

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G2

State Rank: S2

Federal Status:

Location Information:

Directions:

AROUND AMERICAN LEGION LITTLE LEAGUE FIELD NEAR WESTBURY HIGH SCHOOL IN HOUSTON

Survey Information:

First Observation:

Survey Date:

Last Observation: 1976-11-11

Eo Type:

Eo Rank:

Eo Rank Date:

Observed Area:

Comments:

General TIGHT BLACK CLAY SOIL IN MOWED AREA

Description:

Comments:

Protection

Comments:

Management

Comments:

Data:

EO Data: COMMON; FLOWERING IN NOVEMBER 1976

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

Specimen:

Southern Methodist University Herbarium. 1976. L.E. Brown #2121, Specimen # none SMU. 11 November 1976.

Element Occurrence Record

Scientific Name: Chloris texensis

Occurrence #: 21

Eo Id: 4284

Common Name: Texas windmill grass

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G2

State Rank: S2

Federal Status:

Location Information:

Directions:

ALONG RANKIN ROAD 0.1 MILE WEST OF INTERSECTION WITH JFK BLVD. AT HOUSTON INTERCONTINENTAL AIRPORT

Survey Information:

First Observation: 1984-10-26

Survey Date:

Last Observation: 1984-10-26

Eo Type:

Eo Rank:

Eo Rank Date:

Observed Area:

Comments:

General Description: EDGE OF BARE SOIL AREAS OF GULF COASTAL PRAIRIE

Comments:

Protection

Comments:

Management

Comments:

Data:

EO Data: IN FLOWER 26 OCTOBER 1984; IN 1997, 1998, 2000-2002 SITE NOT SURVEYED; IN 1999, SITE SURVEYED BUT NOT SEEN

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

Linam, Lee Ann. 2002. Final Report Project WER 09(72): Implementation of candidate species monitoring. Grant No. E-9. 1 November 2002.

Specimen:

SOUTHERN METHODIST UNIVERSITY HERBARIUM. 1984. JOHN R. WARD #1333, SPECIMEN # NONE SMU. 26 OCTOBER 1984.

Stephen F. Austin State University Herbarium. 1984. J.R. Ward #1333, Specimen # ? ASTC. 26 October 1984.

Element Occurrence Record

Scientific Name: Haliaeetus leucocephalus

Occurrence #: 123

Eo Id: 472

Common Name: Bald Eagle

Track Status: Track all extant and selected historical EOs

TX Protection Status: T

Global Rank: G5

State Rank: S3B,S3N

Federal Status:

Location Information:

Directions:

TERRITORY ON SPRING CREEK (MONTGOMERY/HARRIS COUNTY LINE), EXTENDING SOUTHWARD FROM SHENANDOAH TO SPRING

Survey Information:

First Observation: 2000

Survey Date: 2005

Last Observation: 2003

Eo Type:

Eo Rank:

Eo Rank Date:

Observed Area:

Comments:

General

Description:

Comments: TPWD NEST #170-5A

Protection

Comments:

Management

Comments:

Data:

EO Data: NEST # 170-5A: 2000 - NEST WAS ACTIVE BUT PRODUCED 0 YOUNG; 2001 - NEST PRODUCED 2 YOUNG; 2002 - NEST PRODUCED 1 YOUNG; 2003 - NEST PRODUCED 2 YOUNG; 2004-2005 - NEST WAS INACTIVE.

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Element Occurrence Record

Citation:

Ortego, Brent. 2001. Performance Report Project No. 10: Bald eagle nest survey and management. Federal Aid Grant No. W-125-R-12. 30 September 2001.

Ortego, Brent. 2002. Maps clarifying questions about bald eagle territory locations from the 2001 survey. 13 June 2002.

Polasek, Len G. 2000. Performance report Project No. 10: Bald eagle nest survey and management. Federal Aid Grant No. W-125-R-11. 31 August 2000.

Ortego, Brent. 2003. Chronological outcome of bald eagle nest surveys in Texas, 1982-2003.

Gregory, Chris. 2004. Chronological outcome of bald eagle nest surveys in East Texas, 1982-2004.

Ortego, Brent. 2005. Performance report Project No. 10: Bald eagle nest survey and management. Federal Aid Grant No. W-125-R-16. 30 September 2005.

Specimen:

Element Occurrence Record

Scientific Name: Hymenoxys texana

Occurrence #: 18

Eo Id: 6775

Common Name: Texas prairie dawn

Track Status: Track all extant and selected historical EOs

TX Protection Status: E

Global Rank: G2

State Rank: S2

Federal Status: LE

Location Information:

Directions:

OFF DOUBLE H ROAD, EAST OF NORTH HOUSTON ROSSLYN ROAD, CA 1.8 MILES SOUTH OF TX 149, CA 0.2 MILES NORTHEAST OF FORT WORTH & DENVER RR CROSSING ON HOUSTON ROSSLYN ROAD.

Survey Information:

First Observation:

Survey Date: 1988-03-30

Last Observation: 1988-03-30

Eo Type:

Eo Rank: C

Eo Rank Date:

Observed Area: 10.00

Comments:

General Description: EDGES OF BARE, SALINE "SLICK SPOT" OFTEN ON PERIMETER OF MIMA MOUNDS ON POORLY DRAINED, FINE SANDY LOAM OF NARTA SERIES(?). LISSIE FORMATION (QUATERNARY).

Comments: NOT LISTED IN RECOVERY PLAN. ON MAP SENT BY JULIE MASSEY OF THE USFWS HOUSTON FIELD OFFICE.

Protection

Comments:

Management

Comments:

Data:

EO Data: ESTIMATED 1,000 PLANTS ON 88-30-30 SCATTERED OVER 6-7 SLICK SPOTS. IN 1988, EASTERN-MOST KNOWN SITES AT THE TIME.

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

ORZELL, STEVE AND JACKIE POOLE. 1988. FIELD SURVEY OF HYMENOXYS TEXANA SITES, 28-30 MARCH 1988.

YOUNG, S.M. 1990. HYMENOXYS TEXANA UPDATE 4 SEPTEMBER 1990.

Specimen:

Element Occurrence Record

Scientific Name: Hymenoxys texana

Occurrence #: 20

Eo Id: 1954

Common Name: Texas prairie dawn

Track Status: Track all extant and selected historical EOs

TX Protection Status: E

Global Rank: G2

State Rank: S2

Federal Status: LE

Location Information:

Directions:

ACROSS FROM CITY OF HOUSTON FIRE STATION #4, ON SOUTH SIDE OF WEST LITTLE YORK ROAD. CA 100 FEET WEST OF FIRE HYDRANT NEAR TELEPHONE POLE, ADJACENT TO THE ROAD.

Survey Information:

First Observation:

Survey Date: 1988-03-30

Last Observation: 1988-03-30

Eo Type:

Eo Rank: D

Eo Rank Date:

Observed Area: 1.00

Comments:

General SMALL BARE, SALINE "SLICK SPOT" PROBABLY NARTA SOIL SERIES (TYPIC NATRAQUALFS).

Description: SURROUNDING AREA DEVELOPED OR OVERGROWN IN YAUPON HOLLY THICKETS.

Comments: NOT IN RECOVERY PLAN.

Protection

Comments:

Management

Comments:

Data:

EO Data: ESTIMATED 100 PLANTS, ALL UNBRANCHED AND SMALL, MANY ONLY BASAL ROSETTES.

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

ORZELL, STEVE AND JACKIE POOLE. 1988. FIELD SURVEY OF HYMENOXYS TEXANA SITES, 28-30 MARCH 1988.

Specimen:

Element Occurrence Record

Scientific Name: Hymenoxys texana

Occurrence #: 53

Eo Id: 26

Common Name: Texas prairie dawn

Track Status: Track all extant and selected historical EOs

TX Protection Status: E

Global Rank: G2

State Rank: S2

Federal Status: LE

Location Information:

Directions:

These sites are located approximately 5.4 air miles east-northeast of Missouri City, and 9.4 air miles almost southwest of downtown Houston, just north of US 90 Alternate. The directions are generalized as this record consists of multiple observations.

Survey Information:

First Observation: 1999-02

Survey Date: 2013-04

Last Observation: 2013-04

Eo Type:

Eo Rank: E

Eo Rank Date: 2013-04

Observed Area:

Comments:

General 1999: Sites described as a large field with dense brush and trees around the edge and throughout. 2012-2013:

Description: Site described as a coastal prairie remnant.

Comments:

Protection

Comments:

Management

Comments:

Data:

EO Data: Feb and Mar 1999: Plants were observed at two sites. Apr 2012 and 2013: Plants were observed at two sites.

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

Brown, Larry E. 1999. Letter of 18 March to U.S. Fish and Wildlife Service containing five new Hymenoxys texana occurrences in Harris County.

Harris County Flood Control District. 2013. Coastal prairie management plan for Willow Waterhole Detention Basin (HCFCD Unit No. D512-01-00). November 2013.

Specimen:

Element Occurrence Record

Scientific Name: Hymenoxys texana

Occurrence #: 55

Eo Id: 3565

Common Name: Texas prairie dawn

Track Status: Track all extant and selected historical EOs

TX Protection Status: E

Global Rank: G2

State Rank: S2

Federal Status: LE

Location Information:

Directions:

(Site 1) BEHIND FOXFIRE FARMS ON WEST SIDE OF SOUTH POST OAK ROAD SOUTH OF INTERSECTION WITH ALLUM AND NORTH OF INTERSECTION WITH LOTUS and (Site 2) FOLLOW PIPELINE RIGHT-OF-WAY SOUTHWEST FROM LOTUS STREET WEST OF SOUTH POST OAK; AT INTERSECTION WITH POWERLINE RIGHT-OF-WAY TURN DUE WEST.

Survey Information:

First Observation: 1999-03

Survey Date:

Last Observation: 1999-03

Eo Type:

Eo Rank: E

Eo Rank Date: 1999-03-18

Observed Area:

Comments:

General

Description:

Comments:

Protection

Comments:

Management

Comments:

Data:

EO Data:

Community Information:

Scientific Name:

Stratum:

Dominant:

Lifeform:

Composition Note:

Reference:

Citation:

Brown, Larry E. 1999. Letter of 18 March to U.S. Fish and Wildlife Service containing five new Hymenoxys texana occurrences in Harris County.

Specimen:

Element Occurrence Record

Scientific Name: Lithobates areolatus areolatus

Occurrence #: 3

Eo Id: 1329

Common Name: Southern Crawfish Frog

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G4T4

State Rank: S3

Federal Status:

Location Information:

Directions:

12 miles NW of Houston. These directions are generalized as this EO consists of multiple source features.

Survey Information:

First Observation: 1952-02-01

Survey Date: 1952-02-01

Last Observation: 1952-02-01

Eo Type:

Eo Rank: H

Eo Rank Date: 1952-02-01

Observed Area:

Comments:

General

Description:

Comments:

Protection

Comments:

Management

Comments:

Data:

EO Data: 1952: A specimen was collected. 1 Feb 1952: Five specimens were collected.

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

Hibbitts, Toby, and Daniel Saenz. 2013. Report for TPWD; Status and breeding biology of the crawfish frog (Lithobates areolatus). Received 1 November 2013. 13 pp.

Specimen:

Element Occurrence Record

Museum of Zoology, University of Michigan, Ann Arbor, MI; Jesse Haver (#unknown), Catalog # 105233, 1952, UMMZ.

Biodiversity Research and Teaching Collections, Texas A&M University, College Station, TX; Cooper, E. H. (#EHC64), Catalog # 9066, 1 Feb 1952, BRTC.

Biodiversity Research and Teaching Collections, Texas A&M University, College Station, TX; Cooper, E. H. (#EHC121), Catalog # 9067, 1 Feb 1952, BRTC.

Biodiversity Research and Teaching Collections, Texas A&M University, College Station, TX; Cooper, E. H. (#EHC65), Catalog # 9068, 1 Feb 1952, BRTC.

Biodiversity Research and Teaching Collections, Texas A&M University, College Station, TX; Grelen, T. D. (#TDG112), Catalog # 9069, 1 Feb 1952, BRTC.

Biodiversity Research and Teaching Collections, Texas A&M University, College Station, TX; Grelen, T. D. (#TDG113), Catalog # 9070, 1 Feb 1952, BRTC.

Element Occurrence Record

Scientific Name: Lithobates areolatus areolatus

Occurrence #: 4

Eo Id: 7944

Common Name: Southern Crawfish Frog

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G4T4

State Rank: S3

Federal Status:

Location Information:

Directions:

Southeast Houston. These directions have been generalized as this EO consists of two source features.

Survey Information:

First Observation: 1948-02-05

Survey Date: 1951

Last Observation: 1948-02-18

Eo Type:

Eo Rank: H

Eo Rank Date: 1951

Observed Area:

Comments:

General

Description:

Comments:

The University of Michigan has five specimens that were collected on 5 and 18 February, 1948. the location for these specimens only states "South Houston". These specimens were not mapped in the database, but could have come from this general area and were the original basis of this EO. Specimen record: University of Michigan, Museum of Zoology. 1948. R.E. Etheridge, Catalog # 115835, 115836 UMMZ. 5, 18 February 1948.

Protection

Comments:

Management

Comments:

Data:

EO Data:

Feb 1948: Five specimens were collected on 5 and 18 February. No Date: Two specimens were collected, one was collected on or before 4 Apr 1951. The second appears to have been collected in 1951.

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

Hibbitts, Toby, and Daniel Saenz. 2013. Report for TPWD; Status and breeding biology of the crawfish frog (Lithobates areolatus). Received 1 November 2013. 13 pp.

Specimen:

Element Occurrence Record

University of Michigan, Museum of Zoology. 1948. R.E. Etheridge, Catalog # 115835, 115836 UMMZ. 5, 18 February 1948.

Mayborn Museum, Baylor University, Waco, TX; John C. Wottring (#unknown), Catalog # AM 1707, No Date, BAYLU.

Mayborn Museum, Baylor University, Waco, TX; John C. Wottring (#unknown), Catalog # AM 1706, On or before April 1, 1951, BAYLU.

Element Occurrence Record

Scientific Name: Lithobates areolatus areolatus

Occurrence #: 21

Eo Id: 11461

Common Name: Southern Crawfish Frog

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G4T4

State Rank: S3

Federal Status:

Location Information:

Directions:

Houston, 3600 block of Danville Rd.

Survey Information:

First Observation: 1944-09-01

Survey Date: 1944-09-01

Last Observation: 1944-09-01

Eo Type:

Eo Rank: H

Eo Rank Date: 1944-09-01

Observed Area:

Comments:

General

Description:

Comments:

Protection

Comments:

Management

Comments:

Data:

EO Data: 1 Sep 1944: A specimen was collected.

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

Hibbitts, Toby, and Daniel Saenz. 2013. Report for TPWD; Status and breeding biology of the crawfish frog (Lithobates areolatus). Received 1 November 2013. 13 pp.

Specimen:

Texas Natural History Collections, The University of Texas at Austin, TX; Milstead (WWM 1), Catalog #8635, 01 Sep 1944, TNHC.

Element Occurrence Record

Scientific Name: Lithobates areolatus areolatus

Occurrence #: 22

Eo Id: 11462

Common Name: Southern Crawfish Frog

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G4T4

State Rank: S3

Federal Status:

Location Information:

Directions:

Houston (south of) in marsh at end of Avenue I.

Survey Information:

First Observation: 1948-05-05

Survey Date: 1950-04-01

Last Observation: 1950-04-01

Eo Type:

Eo Rank: H

Eo Rank Date: 1950-04-01

Observed Area:

Comments:

General 1948: Marsh at the end of Avenue I.

Description:

Comments: J. Wottring has six additional crawfish frog specimens that were collected in Houston , but no precise location was provided. Five of the specimens were collected on 28 Jul 1953: Biodiversity Research and Teaching Collections, Texas A&M University, College Station, TX; Wottring, J. (#JW), Catalog # 80780-80784, 28 Jul 1953, BRTC. The other specimen was collected on 11 Feb 1930: Biodiversity Research and Teaching Collections, Texas A&M University, College Station, TX; Wottring, J. (#JW), Catalog # 80785, 11 Feb 1930, BRTC.

Protection

Comments:

Management

Comments:

Data:

EO Data: 5 Feb 1948: Three specimens were collected. 1 Apr 1950: One specimen was collected.

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

Hibbitts, Toby, and Daniel Saenz. 2013. Report for TPWD; Status and breeding biology of the crawfish frog (Lithobates areolatus). Received 1 November 2013. 13 pp.

Specimen:

Element Occurrence Record

Texas Natural History Collections, The University of Texas at Austin, TX; Milstead, Wottring (WWM 332), Catalog #8636, 05 Feb 1948, TNHC.

Texas Natural History Collections, The University of Texas at Austin, TX; Milstead, Wottring (WWM 333), Catalog #8637, 05 Feb 1948, TNHC.

Texas Natural History Collections, The University of Texas at Austin, TX; Milstead, Wottring (WWM 325), Catalog #8638, 05 Feb 1948, TNHC.

Texas Natural History Collections, The University of Texas at Austin, TX; Wottring (#unknown), Catalog #9737, 01 Apr 1950, TNHC.

Element Occurrence Record

Scientific Name: Lithobates areolatus areolatus

Occurrence #: 23

Eo Id: 11463

Common Name: Southern Crawfish Frog

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G4T4

State Rank: S3

Federal Status:

Location Information:

Directions:

Houston, 8511 Medford Drive.

Survey Information:

First Observation: 1957-06-04

Survey Date: 1957-06-04

Last Observation: 1957-06-04

Eo Type:

Eo Rank: H

Eo Rank Date: 1957-06-04

Observed Area:

Comments:

General

Description:

Comments: The University of Michigan has five specimens that were collected on 5 and 18 February, 1948. the location for these specimens only states "South Houston". These specimens were not mapped in the database, but could have come from this general area. Specimen record: University of Michigan, Museum of Zoology. 1948. R.E. Etheridge, Catalog # 115835, 115836 UMMZ. 5, 18 February 1948.

Protection

Comments:

Management

Comments:

Data:

EO Data: 4 Jun 1957: A specimen was collected.

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

Hibbitts, Toby, and Daniel Saenz. 2013. Report for TPWD; Status and breeding biology of the crawfish frog (Lithobates areolatus). Received 1 November 2013. 13 pp.

Specimen:

Texas Natural History Collections, The University of Texas at Austin, TX; Hermes (WHW 201), Catalog #28861, 04 Jun 1957, TNHC.

Element Occurrence Record

Scientific Name: Macrochelys temminckii

Occurrence #: 1

Eo Id: 7552

Common Name: Alligator Snapping Turtle

Track Status: Track all extant and selected historical EOs

TX Protection Status: T

Global Rank: G3G4

State Rank: S3

Federal Status:

Location Information:

Directions:

WHITE OAK BAYOU AT HB & T RAILROAD TRESTLE, NEAR W. 34TH, HOUSTON.

Survey Information:

First Observation:

Survey Date:

Last Observation: 1968-08-28

Eo Type:

Eo Rank:

Eo Rank Date:

Observed Area:

Comments:

General

Description:

Comments: SPECIMEN COLLECTED AUGUST 28TH.

Protection

Comments:

Management

Comments:

Data:

EO Data:

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

MCCLURE, W. L. 1968. SPECIMEN #11196, ONE SPECIMEN. STRECKER MUSEUM, BAYLOR UNIVERSITY.

Specimen:

Baylor University, Strecker Museum. 1968. W.L. McClure, Catalog # 11196 SM. 28 August 1968.

MCCLURE, W. L. 1968. SPECIMEN #11196, ONE SPECIMEN. STRECKER MUSEUM, BAYLOR UNIVERSITY.
(S68MCCSMTXUS)

Element Occurrence Record

Scientific Name: Quercus nigra-quercus phellos series

Occurrence #: 3 **Eo Id:** 1657

Common Name: Water Oak-willow Oak Series

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G4

State Rank: S3

Federal Status:

Location Information:

Directions:

TAKE WOODWAY FROM LOOP 610. GO WEST ONE BLOCK & TURN RIGHT (NORTH) ON NORTH POST OAK. FAYS ARE THE FIRST DRIVE ON THE LEFT (WEST).

Survey Information:

First Observation: 1984

Survey Date: 1984-06-18

Last Observation: 1984-06-18

Eo Type:

Eo Rank: BC

Eo Rank Date:

Observed Area: 7.00

Comments:

General Description: OLD-GROWTH SOUTHERN FLOODPLAIN FOREST REMNANT ADJACENT TO TWO ESTATES ON BUFFALO BAYOU.

Comments: FOREST IS APPROACHING SENESCENCE. REGENERATION POTENTIAL UNDER URBAN STRESS IS UNKNOWN.

Protection Comments: NEED TO SEEK RETENTION OF LOW-DENSITY BUFFER AREAS

Management Comments: NONE

Data:

EO Data: FOREST REMNANT APPROACHING MATURITY. LOW REPRODUCTION, HIGH STRESS (AIR-POLLUTION).

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

BROWN, B.A. 1984. FIELD SURVEY TO FAY PROPERTY OF JUNE 18, 1984.

Specimen:

Element Occurrence Record

Scientific Name: Rayjacksonia aurea

Occurrence #: 1

Eo Id: 4408

Common Name: Houston daisy

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G2

State Rank: S2

Federal Status:

Location Information:

Directions:

JUNCTION OF HIGHWAY 290 AND WEST 34TH STREET, VACANT LOTS TO THE SOUTH, 2 BLOCKS WEST, AND ABOUT 75 TO 100 FEET EAST OF RAILROAD TRACK, HOUSTON

Survey Information:

First Observation: 1964-10-07

Survey Date:

Last Observation: 1964-10-16

Eo Type:

Eo Rank: X

Eo Rank Date:

Observed Area:

Comments:

General GRASSY AREAS IN VACANT LOTS AND IN FIELD SOUTH OF WEST 34TH STREET.

Description:

Comments:

Protection

Comments:

Management

Comments:

Data:

EO Data: IN FLOWER; 3 SMALL COLONIES; WIDELY SCATTERED

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

MAHLER, W. F. 1980. USF& WS STATUS REPORT ON MACHRANTHERA AUREA.

Specimen:

University of Texas at Austin Herbarium. 1964. R.C. Jackson #5242, Specimen # 234272 TEX. 7 October 1964.

Southern Methodist University Herbarium. 1964. E.B. Smith #645, Specimen # none SMU. 16 October 1964.

Element Occurrence Record

Scientific Name: Rayjacksonia aurea

Occurrence #: 4 **Eo Id:** 2849

Common Name: Houston daisy

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G2

State Rank: S2

Federal Status:

Location Information:

Directions:

WEST 'WEST THORNE ROAD' IN FRONT OF NORTH HARRIS COUNTY COLLEGE

Survey Information:

First Observation: 1983-10-25

Survey Date:

Last Observation: 2002-11

Eo Type:

Eo Rank:

Eo Rank Date:

Observed Area:

Comments:

General Description: ROADSIDE CLEARING; SANDY SOIL; AMONG BARREN PATCHES

Comments: SAMPLING METHODS: A 0.5 X 0.5 METER QUADRAT SUBDIVIDED INTO 0.01 SQUARE METER CELLS IS USED TO DETERMINE AN INDEX OF CANOPY COVER BASED UPON TOTAL NUMBER OF 0.01 SQUARE METER CELLS OCCUPIED; IN 2001, A LOAD OF DIRT WAS DUMPED INTO THE LOW AREA OCCUPIED BY THE PLANTS, AN EFFORT WAS MADE TO REMOVE THE DIRT WITHOUT HARMING THE PLANTS

Protection Comments:

Management Comments:

Data:

EO Data: IN FLOWER IN 1983; IN 1997, CONFIRMED, IN BARREN SPOTS JUST ACROSS DITCH AND SOUTH AND SOUTHWEST OF JOGGING TRAIL; IN 1998, CONFIRMED IN SAME LOCATIONS, MANY SMALL PLANTS SCATTERED AMONG BARREN PATCHES, MOWED TO CA. 1 INCH; 5 NOVEMBER 1999, SURVEY INCOMPLETE, 85 OCCUPIED QUADRATS WITH 823 OCCUPIED CELLS; 2 NOVEMBER 2000, SURVEY INCOMPLETE, 483 SQUARE METERS SURVEYED WITH 126 OCCUPIED QUADRATS AND 919 OCCUPIED CELLS; IN 2001, PRESENCE CONFIRMED, A LOAD OF DIRT WAS ALSO DUMPED INTO THE LOW AREA OCCUPIED BY THE PLANTS; IN NOVEMBER 2002, PLANTS SURVIVED THE DEPOSITION AND REMOVAL OF DIRT, APPEARED STRESSED DUE TO INUNDATION, 817 SQUARE METERS SURVEYED WITH 124 OCCUPIED QUADRATS WITH 1236 OCCUPIED CELLS

Community Information:

Scientific Name:	Stratum:	Dominant:	Lifeform:	Composition Note:

Reference:

Element Occurrence Record

Citation:

Linam, Lee Ann. 2002. Final Report Project WER 09(72): Implementation of candidate species monitoring. Grant No. E-9. 1 November 2002.

LINAM, LEE ANN. NO DATE. WILDLIFE DIVERSITY BRANCH, TEXAS PARKS AND WILDLIFE DEPARTMENT, 200 HOOTS HOLLER, WIMBERLEY, TX 78676; PHONE (512) 847-9480; leeann.linam@tpwd.state.tx.us

Specimen:

TEXAS A & M UNIVERSITY, TRACY HERBARIUM. 1983. JAMES KESSLER #7411, SPECIMEN #166928 TAES. 25 OCTOBER 1983.

University of Texas at Austin Herbarium. 1983. James Kessler #7411, Specimen # none TEX. 25 October 1983.

Southern Methodist University Herbarium. 1983. James Kessler #7411, Specimen # none SMU. 25 October 1983.

Element Occurrence Record

Scientific Name: Rayjacksonia aurea

Occurrence #: 24

Eo Id: 7144

Common Name: Houston daisy

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G2

State Rank: S2

Federal Status:

Location Information:

Directions:

CA. 300-500 FEET WEST OF WEST EDGE OF PARKING LOT ON WEST SIDE OF NORTH HARRIS COUNTY COLLEGE, SOUTH OF PINE-OAK FOREST STRIP, SOUTH OF HIKING TRAIL, IN SOCCER FIELD AND ADJACENT MOWN AREA

Survey Information:

First Observation: 1994-11-18

Survey Date: 1998-11-04

Last Observation: 1998-11-04

Eo Type:

Eo Rank:

Eo Rank Date:

Observed Area:

Comments:

General Description: BARE SPOTS IN VERY FREQUENTLY MOWN LAWN ON SOILS MAPPED AS CLODINE LOAM

Comments: DISCOVERED 18 NOVEMBER 1994 BY GREG WIELAND; REVISITED 1997 BY LEE ANN LINAM

Protection

Comments:

Management

Comments:

Data:

EO Data: 30-40 PLANTS OBSERVED ON 4 NOVEMBER 1998, MOST IN FLOWER AND/OR FRUIT

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

CARR, W.R. 1998. NOTES ON FIELD SURVEYS OF SOME TEXAS WINDMILL-GRASS AND HOUSTON DAISY SITES IN HARRIS COUNTY, TEXAS, 4 NOVEMBER 1998.

Specimen:

Element Occurrence Record

Scientific Name: Spilogale putorius interrupta

Occurrence #: 12

Eo Id: 473

Common Name: plains spotted skunk

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G4T4

State Rank: S3

Federal Status:

Location Information:

Directions:

IN ATTIC JUST SOUTH OF FM 1960 CLOSE TO STUEBNER-AIRLINE ROAD

Survey Information:

First Observation:

Survey Date:

Last Observation: 1989-12-15

Eo Type:

Eo Rank:

Eo Rank Date:

Observed Area:

Comments:

General

Description:

Comments:

Protection

Comments:

Management

Comments:

Data:

EO Data: LIVE TRAPPED ADULT MALE SPOTTED SKUNK

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

Olhausen, Don. 1995. Letter of 16 February to Peggy Horner, Texas Parks and Wildlife Department, Conservation Biologist, regarding spotted skunks (Spilogale putorius) in the Spring Texas area, Waller, Harris, and San Jacinto counties.

Specimen:

Element Occurrence Record

Scientific Name: *Thalictrum texanum*

Occurrence #: 13

Eo Id: 7697

Common Name: Texas meadow-rue

Track Status: Track all extant and selected historical EOs

TX Protection Status:

Global Rank: G2Q

State Rank: S2

Federal Status:

Location Information:

Directions:

JUNCTION OF CLIFFWOOD AND MCDERMED ROADS, EAST AT 10 METERS AND 90 METERS UNDER POWERLINE IN WILLOW PARK

Survey Information:

First Observation: 2004-01-28

Survey Date: 2004-01-28

Last Observation: 2004-01-28

Eo Type:

Eo Rank:

Eo Rank Date:

Observed Area:

Comments:

General Description: MICRO-RELIEF, RELATIVELY FLAT TERRAIN WITH PLANTS GROWING ON HIGHER, SLIGHTLY MOUNDED FEATURES IN WILLOW PARK; SPOROBOLUS INDICUS AND STENOTAPHRUM SECUNDATUM DOMINANTS

Comments: HIGHLY DISTURBED AND MANICURED PARK

Protection

Comments:

Management

Comments:

Data:

EO Data: THREE SUBPOPULATIONS OF PLANTS UNDER POWERLINE GOING WEST TO EAST; SUBPOPULATION 1 IS CA. 150 INDIVIDUALS, SUBPOPULATION 2 IS 34 PLANTS, AND SUBPOPULATION 3 IS 7 PLANTS; PLANTS VEGETATIVE ONLY

Community Information:

<u>Scientific Name:</u>	<u>Stratum:</u>	<u>Dominant:</u>	<u>Lifeform:</u>	<u>Composition Note:</u>

Reference:

Citation:

SINGHURST, JASON. 2004. FIELD NOTES ON THALICTRUM TEXANUM IN HARRIS AND WALLER COUNTIES, 28 JANUARY 2004.

Specimen:

BAYLOR UNIVERSITY HERBARIUM. 2004. JASON SINGHURST #12540 AND BILL CARR, SPECIMEN # ? BAYLU. 28 JANUARY 2004.

Common	EcoSystem	MOU_Habita	Acres	Shape_Leng	Shape_Area
Barren	Water	Agriculture	0.410	328.9	1658.4
Barren	Water	Agriculture	1.856	867.1	7509.0
Barren	Water	Agriculture	0.086	101.1	349.7
Barren	Water	Agriculture	0.115	111.2	465.4
Native Invasive: Deciduous Woodland	LOAMY PRAIRIE PE 31-44	Disturbed Prairie	0.202	191.2	816.5
Native Invasive: Deciduous Woodland	LOWLAND PE 31-44	Disturbed Prairie	0.596	351.8	2412.1
Native Invasive: Deciduous Woodland	BLACKLAND	Disturbed Prairie	1.076	370.3	4356.2
Grass Farm	Water	Agriculture	0.523	261.1	2116.9
Gulf Coast: Coastal Prairie	LOAMY PRAIRIE PE 31-44	Coastal Grassland	0.083	97.2	337.6
Gulf Coast: Coastal Prairie	LOAMY PRAIRIE PE 31-44	Coastal Grassland	0.450	324.0	1819.9
Gulf Coast: Coastal Prairie	LOWLAND PE 31-44	Coastal Grassland	0.056	94.6	225.4
Gulf Coast: Coastal Prairie	LOWLAND PE 31-44	Coastal Grassland	0.040	52.1	160.2
Pineywoods: Disturbance or Tame Grassland	Disturbance	Disturbed Prairie	0.382	175.3	1544.3
Pineywoods: Disturbance or Tame Grassland	Disturbance	Disturbed Prairie	6.872	2727.9	27812.0
Pineywoods: Disturbance or Tame Grassland	Disturbance	Disturbed Prairie	1.528	759.1	6185.2
Pineywoods: Disturbance or Tame Grassland	Disturbance	Disturbed Prairie	4.250	1800.0	17200.0
Open Water	Water	Riparian	0.171	119.7	692.8
Open Water	Water	Riparian	2.514	1138.3	10174.4
Open Water	Water	Riparian	1.427	847.4	5773.4
Urban High Intensity	Water	Urban	0.174	181.4	705.5
Urban High Intensity	Water	Urban	0.006	28.8	22.3
Urban High Intensity	Water	Urban	0.044	60.2	179.2
Urban High Intensity	Water	Urban	0.076	149.4	307.8
Urban Low Intensity	Water	Urban	1.383	399.3	5596.2
Urban Low Intensity	Water	Urban	0.357	224.0	1443.4
Urban Low Intensity	Water	Urban	2.195	1364.7	8881.8
Urban Low Intensity	Water	Urban	0.005	20.9	21.8
Urban Low Intensity	Water	Urban	0.000	2.8	0.3
Urban Low Intensity	Water	Urban	0.068	111.6	273.7
Urban Low Intensity	Water	Urban	0.008	32.2	33.6
Urban Low Intensity	Water	Urban	0.445	235.0	1802.0
Urban Low Intensity	Water	Urban	0.123	137.9	498.2
Urban Low Intensity	Water	Urban	0.791	280.0	3200.0
Urban Low Intensity	Water	Urban	0.810	326.2	3279.0

Common	EcoSystem	MOU_Habita	Acres	Shape_Leng	Shape_Area
Urban Low Intensity	Water	Urban	1.856	715.1	7511.8
Urban Low Intensity	Water	Urban	0.845	363.5	3420.5
Urban Low Intensity	Water	Urban	4.974	978.6	20128.5
Urban Low Intensity	Water	Urban	1.059	620.2	4284.9
Urban Low Intensity	Water	Urban	0.823	659.8	3329.2
Urban Low Intensity	Water	Urban	1.359	360.0	5500.0
Urban Low Intensity	Water	Urban	1.448	981.9	5860.8
Urban Low Intensity	Water	Urban	0.352	435.0	1422.6
Urban Low Intensity	Water	Urban	0.364	268.2	1473.3
Urban Low Intensity	Water	Urban	14.292	2528.8	57839.5
Urban Low Intensity	Water	Urban	11.152	2537.4	45129.3
Urban Low Intensity	Water	Urban	1.620	1107.1	6557.7
Urban Low Intensity	Water	Urban	3.946	2330.3	15968.0
Urban Low Intensity	Water	Urban	15.633	3217.7	63263.2
Urban Low Intensity	Water	Urban	0.032	49.8	130.3
Urban Low Intensity	Water	Urban	0.028	79.3	115.3
Urban Low Intensity	Water	Urban	2.024	533.3	8190.5
Urban Low Intensity	Water	Urban	2.126	562.9	8604.0
Urban Low Intensity	Water	Urban	1.281	554.6	5185.1
Urban Low Intensity	Water	Urban	1.240	850.7	5018.9
Urban Low Intensity	Water	Urban	21.078	5299.9	85300.1
Urban Low Intensity	Water	Urban	2.314	1019.7	9365.8
Urban Low Intensity	Water	Urban	0.032	68.4	128.2
Urban Low Intensity	Water	Urban	0.669	271.3	2706.0
Urban Low Intensity	Water	Urban	0.074	165.7	299.8
Urban Low Intensity	Water	Urban	8.565	4302.1	34659.8
Urban Low Intensity	Water	Urban	0.496	368.3	2005.3
Urban Low Intensity	Water	Urban	0.749	381.2	3032.2
Urban Low Intensity	Water	Urban	0.003	14.9	10.7
Urban Low Intensity	Water	Urban	0.155	111.4	626.4
Urban Low Intensity	Water	Urban	0.082	93.4	333.2
Urban Low Intensity	Water	Urban	0.716	369.7	2899.4
Urban Low Intensity	Water	Urban	0.295	167.1	1192.4
Urban Low Intensity	Water	Urban	1.419	921.5	5740.6

Common	EcoSystem	MOU_Habita	Acres	Shape_Leng	Shape_Area
Urban Low Intensity	Water	Urban	0.266	335.1	1075.6
Urban Low Intensity	Water	Urban	0.066	66.6	265.2
Urban Low Intensity	Water	Urban	0.237	191.0	958.1
Urban Low Intensity	Water	Urban	0.299	343.7	1209.1
Urban Low Intensity	Water	Urban	6.423	3912.3	25994.3
Post Oak Savanna: Post Oak - Redcedar Motte and Woodland	BLACKLAND	Post Oak Savanna	1.609	651.8	6510.7
Urban Low Intensity	Water	Urban	0.122	124.4	492.4
Barren	Water	Agriculture	0.263	169.6	1065.8
Post Oak Savanna: Live Oak Motte and Woodland	LOWLAND PE 31-44	Post Oak Savanna	0.021	84.4	83.9
Gulf Coast: Coastal Prairie	LOWLAND PE 31-44	Coastal Grassland	0.123	232.3	496.8
Urban Low Intensity	Water	Urban	0.103	312.0	415.2
Urban Low Intensity	Water	Urban	0.065	333.1	261.3
Urban Low Intensity	Water	Urban	0.112	277.2	452.6
Urban Low Intensity	Water	Urban	0.401	213.9	1624.7
Urban High Intensity	Water	Urban	187.614	53649.5	759245.0
Urban High Intensity	Water	Urban	8.688	5931.4	35158.7
Urban High Intensity	Water	Urban	89.304	37128.9	361400.4
Urban Low Intensity	Water	Urban	0.075	172.6	302.3
Urban Low Intensity	Water	Urban	0.253	363.8	1025.0
Urban High Intensity	Water	Urban	200.810	82077.3	812647.3
Urban High Intensity	Water	Urban	519.141	246457.9	2100887.7
Urban Low Intensity	Water	Urban	0.255	398.7	1032.1
Urban Low Intensity	Water	Urban	0.198	399.2	800.1
Urban High Intensity	Water	Urban	505.282	240632.1	2044802.7
Urban Low Intensity	Water	Urban	0.428	724.0	1731.0
Urban Low Intensity	Water	Urban	1.211	931.1	4900.7
Urban High Intensity	Water	Urban	0.047	115.1	188.9
Urban High Intensity	Water	Urban	0.047	115.1	188.9
Urban Low Intensity	Water	Urban	0.188	478.6	761.8
Urban Low Intensity	Water	Urban	0.015	60.9	59.3
Urban Low Intensity	Water	Urban	0.358	197.3	1448.9
Urban Low Intensity	Water	Urban	0.524	332.8	2120.2
Urban Low Intensity	Water	Urban	1.683	368.4	6809.2
Urban Low Intensity	Water	Urban	0.070	194.6	281.4

Common	EcoSystem	MOU_Habita	Acres	Shape_Leng	Shape_Area
Urban Low Intensity	Water	Urban	0.486	341.5	1964.9
Urban Low Intensity	Water	Urban	0.022	102.1	87.8
Urban Low Intensity	Water	Urban	0.950	491.5	3843.7
Urban Low Intensity	Water	Urban	0.135	99.3	545.6
Urban Low Intensity	Water	Urban	0.050	68.3	204.1
Urban Low Intensity	Water	Urban	0.475	371.7	1920.8
Urban Low Intensity	Water	Urban	0.099	338.4	401.8
Urban Low Intensity	Water	Urban	0.041	139.0	164.2
Urban Low Intensity	Water	Urban	0.141	167.9	569.3
Urban Low Intensity	Water	Urban	0.015	73.4	59.7
Urban Low Intensity	Water	Urban	1.374	822.5	5560.1
Urban Low Intensity	Water	Urban	0.019	122.6	78.2
Urban Low Intensity	Water	Urban	0.021	65.7	84.6
Barren	Water	Agriculture	0.005	24.0	20.1
Gulf Coast: Coastal Prairie	LOAMY PRAIRIE PE 31-44	Coastal Grassland	0.055	108.9	221.0
Gulf Coast: Coastal Prairie	LOWLAND PE 31-44	Coastal Grassland	0.128	173.1	518.8
Pineywoods: Disturbance or Tame Grassland	Disturbance	Disturbed Prairie	0.033	90.2	134.5
Urban High Intensity	Water	Urban	0.018	42.0	73.6
Urban Low Intensity	Water	Urban	0.210	397.7	851.8
Urban Low Intensity	Water	Urban	0.247	473.0	1001.0
Urban Low Intensity	Water	Urban	0.020	48.1	80.2
Urban Low Intensity	Water	Urban	2.027	981.7	8204.3
Urban Low Intensity	Water	Urban	0.250	139.7	1012.9
Urban Low Intensity	Water	Urban	0.001	8.8	3.1
Urban Low Intensity	Water	Urban	0.716	546.4	2897.0
Urban Low Intensity	Water	Urban	0.151	137.8	611.4
Urban Low Intensity	Water	Urban	0.000	7.1	2.0
Urban Low Intensity	Water	Urban	0.368	355.1	1489.8
Urban Low Intensity	Water	Urban	0.242	344.9	980.7
Urban Low Intensity	Water	Urban	0.364	306.2	1473.2
Urban Low Intensity	Water	Urban	0.428	436.6	1733.5
Urban Low Intensity	Water	Urban	0.351	433.4	1421.5
Urban Low Intensity	Water	Urban	0.249	341.0	1006.3
Urban Low Intensity	Water	Urban	0.088	106.7	354.7

Common	EcoSystem	MOU_Habita	Acres	Shape_Leng	Shape_Area
Urban Low Intensity	Water	Urban	0.299	213.9	1210.4
Urban Low Intensity	Water	Urban	0.511	376.3	2067.1
Urban Low Intensity	Water	Urban	0.004	20.9	17.1
Urban Low Intensity	Water	Urban	0.328	343.9	1327.6
Urban Low Intensity	Water	Urban	2.304	1289.6	9323.3
Urban Low Intensity	Water	Urban	0.898	874.2	3634.6
Urban Low Intensity	Water	Urban	0.666	427.9	2695.0
Urban Low Intensity	Water	Urban	0.040	88.2	160.6
Urban Low Intensity	Water	Urban	0.040	84.3	160.5
Urban Low Intensity	Water	Urban	0.465	482.9	1882.2
Urban Low Intensity	Water	Urban	0.052	201.4	210.9
Urban Low Intensity	Water	Urban	0.426	496.6	1723.3
Urban Low Intensity	Water	Urban	1.314	781.6	5316.9
Urban Low Intensity	Water	Urban	1.496	1144.8	6053.8
Urban Low Intensity	Water	Urban	0.001	16.0	5.5
Urban Low Intensity	Water	Urban	0.310	536.8	1256.3
Urban Low Intensity	Water	Urban	1.024	716.5	4144.0
Urban Low Intensity	Water	Urban	0.553	313.0	2237.3
Urban Low Intensity	Water	Urban	0.531	399.2	2147.0
Urban Low Intensity	Water	Urban	0.323	356.5	1305.7
Urban Low Intensity	Water	Urban	5.466	6126.6	22121.4
Urban Low Intensity	Water	Urban	0.000	8.2	1.5
Urban Low Intensity	Water	Urban	0.388	654.3	1569.1
Urban Low Intensity	Water	Urban	0.058	135.4	235.2
Urban Low Intensity	Water	Urban	0.095	165.7	383.0
Urban Low Intensity	Water	Urban	0.155	212.7	627.2
Urban Low Intensity	Water	Urban	0.962	467.3	3894.9
Urban Low Intensity	Water	Urban	1.846	809.3	7469.5
Urban Low Intensity	Water	Urban	0.016	181.4	63.9
Urban Low Intensity	Water	Urban	1.234	1697.0	4995.6
Post Oak Savanna: Post Oak - Redcedar Motte and Woodland	BLACKLAND	Post Oak Savanna	0.023	44.9	93.9
Urban Low Intensity	Water	Urban	1.637	2015.1	6624.8
Gulf Coast: Coastal Prairie	LOWLAND PE 31-44	Coastal Grassland	0.100	166.1	405.5
Urban Low Intensity	Water	Urban	0.297	530.3	1203.7

Common	EcoSystem	MOU_Habita	Acres	Shape_Leng	Shape_Area
Urban Low Intensity	Water	Urban	0.386	302.1	1561.4
Urban Low Intensity	Water	Urban	0.001	14.0	4.1
Urban Low Intensity	Water	Urban	0.003	21.1	13.1
Barren	Water	Agriculture	0.383	347.5	1549.8
Barren	Water	Agriculture	1.662	801.2	6725.8
Barren	Water	Agriculture	0.166	135.4	671.7
Barren	Water	Agriculture	0.198	120.2	802.8
Native Invasive: Deciduous Woodland	LOAMY PRAIRIE PE 31-44	Disturbed Prairie	0.094	135.5	381.2
Native Invasive: Deciduous Woodland	LOWLAND PE 31-44	Disturbed Prairie	1.248	388.4	5051.1
Grass Farm	Water	Agriculture	0.513	289.2	2076.2
Gulf Coast: Coastal Prairie	LOAMY PRAIRIE PE 31-44	Coastal Grassland	0.051	61.5	205.3
Gulf Coast: Coastal Prairie	LOAMY PRAIRIE PE 31-44	Coastal Grassland	0.568	324.6	2300.0
Gulf Coast: Coastal Prairie	LOWLAND PE 31-44	Coastal Grassland	0.650	256.8	2629.2
Open Water	Water	Riparian	0.001	17.1	3.0
Open Water	Water	Riparian	0.728	666.0	2946.9
Urban High Intensity	Water	Urban	0.214	265.1	864.9
Urban High Intensity	Water	Urban	0.254	166.3	1026.4
Urban High Intensity	Water	Urban	0.125	153.6	506.2
Urban Low Intensity	Water	Urban	0.947	702.9	3834.0
Urban Low Intensity	Water	Urban	0.315	574.0	1276.7
Urban Low Intensity	Water	Urban	0.352	295.8	1425.7
Urban Low Intensity	Water	Urban	1.677	880.9	6788.1
Urban Low Intensity	Water	Urban	0.280	171.4	1132.6
Urban Low Intensity	Water	Urban	0.006	24.6	24.3
Urban Low Intensity	Water	Urban	1.128	892.1	4565.5
Urban Low Intensity	Water	Urban	0.036	97.9	147.4
Urban Low Intensity	Water	Urban	0.052	87.4	209.7
Urban Low Intensity	Water	Urban	0.003	15.0	13.2
Urban Low Intensity	Water	Urban	0.010	52.4	40.3
Urban Low Intensity	Water	Urban	0.013	40.8	51.3
Urban Low Intensity	Water	Urban	0.031	45.1	124.9
Urban Low Intensity	Water	Urban	0.286	393.5	1156.7
Urban Low Intensity	Water	Urban	0.836	832.9	3383.2
Urban Low Intensity	Water	Urban	0.032	96.9	130.9

Common	EcoSystem	MOU_Habita	Acres	Shape_Leng	Shape_Area
Urban Low Intensity	Water	Urban	0.106	82.5	430.9
Urban Low Intensity	Water	Urban	0.754	496.5	3050.2
Urban Low Intensity	Water	Urban	0.647	405.6	2616.8
Urban Low Intensity	Water	Urban	0.258	299.0	1044.9
Urban Low Intensity	Water	Urban	0.055	70.5	221.5
Urban Low Intensity	Water	Urban	0.453	308.9	1834.6
Urban Low Intensity	Water	Urban	0.060	122.6	243.0
Urban Low Intensity	Water	Urban	1.327	1434.1	5369.7
Urban Low Intensity	Water	Urban	3.876	1640.8	15685.1
Urban Low Intensity	Water	Urban	1.320	870.8	5339.9
Urban Low Intensity	Water	Urban	0.097	172.8	392.6
Urban Low Intensity	Water	Urban	0.193	468.3	782.4
Urban Low Intensity	Water	Urban	0.651	793.6	2633.9
Urban Low Intensity	Water	Urban	0.519	871.1	2099.1
Urban Low Intensity	Water	Urban	1.078	743.5	4362.5
Urban Low Intensity	Water	Urban	2.461	2065.4	9961.2
Urban Low Intensity	Water	Urban	0.018	63.3	74.4
Urban Low Intensity	Water	Urban	2.207	1913.1	8931.8
Urban Low Intensity	Water	Urban	2.471	1292.3	10001.2
Urban Low Intensity	Water	Urban	0.740	427.9	2993.2
Urban Low Intensity	Water	Urban	0.793	474.6	3208.2
Urban Low Intensity	Water	Urban	0.776	555.9	3141.7
Urban Low Intensity	Water	Urban	24.136	11975.4	97675.7
Urban Low Intensity	Water	Urban	1.201	772.4	4860.8
Urban Low Intensity	Water	Urban	0.529	236.8	2139.2
Urban Low Intensity	Water	Urban	0.445	253.2	1800.2
Urban Low Intensity	Water	Urban	8.956	4138.3	36243.0
Urban Low Intensity	Water	Urban	0.673	388.1	2722.1
Urban Low Intensity	Water	Urban	0.637	368.1	2576.4
Urban Low Intensity	Water	Urban	0.000	4.8	0.9
Urban Low Intensity	Water	Urban	0.787	279.1	3183.8
Urban Low Intensity	Water	Urban	0.063	170.2	256.4
Urban Low Intensity	Water	Urban	0.123	93.3	498.4
Urban Low Intensity	Water	Urban	0.216	247.6	872.8

Common	EcoSystem	MOU_Habita	Acres	Shape_Leng	Shape_Area
Urban Low Intensity	Water	Urban	2.073	1233.5	8389.8
Urban Low Intensity	Water	Urban	0.040	56.3	162.6
Urban Low Intensity	Water	Urban	1.656	603.2	6700.8
Urban Low Intensity	Water	Urban	0.696	246.5	2816.8
Urban Low Intensity	Water	Urban	1.201	448.4	4859.8
Urban Low Intensity	Water	Urban	8.234	5077.4	33320.8
Post Oak Savanna: Post Oak - Redcedar Motte and Woodland	BLACKLAND	Post Oak Savanna	0.073	146.1	295.2
Urban Low Intensity	Water	Urban	5.744	3328.6	23245.3
Barren	Water	Agriculture	0.335	165.2	1354.8
Post Oak Savanna: Live Oak Motte and Woodland	LOWLAND PE 31-44	Post Oak Savanna	0.262	233.9	1058.5
Native Invasive: Deciduous Woodland	LOWLAND PE 31-44	Disturbed Prairie	0.011	141.3	45.3
Gulf Coast: Coastal Prairie	LOWLAND PE 31-44	Coastal Grassland	0.059	141.7	238.6
Gulf Coast: Coastal Prairie	LOWLAND PE 31-44	Coastal Grassland	0.753	426.2	3048.9
Urban Low Intensity	Water	Urban	1.444	377.9	5841.8
Urban Low Intensity	Water	Urban	2.086	858.7	8440.0
Urban Low Intensity	Water	Urban	0.514	578.2	2080.9
Urban Low Intensity	Water	Urban	0.757	657.5	3062.2
Urban Low Intensity	Water	Urban	0.016	72.4	65.5

Common	Original MOU Habitat	Acres	Corrected MOU Habitat
Barren	Agriculture	0.793	Urban
Barren	Agriculture	0.252	Urban
Barren	Agriculture	0.313	Urban
Native Invasive: Deciduous Woodland	Disturbed Prairie	0.296	Urban
Native Invasive: Deciduous Woodland	Disturbed Prairie	1.844	Urban
Native Invasive: Deciduous Woodland	Disturbed Prairie	1.076	Riparian
Grass Farm	Agriculture	1.036	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.134	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.817	Urban
Pineywoods: Disturbance or Tame Grassland	Disturbed Prairie	0.382	Urban
Pineywoods: Disturbance or Tame Grassland	Disturbed Prairie	11.156	Urban
Open Water	Riparian	0.172	Urban
Open Water	Riparian	1.522	Open Water
Urban High Intensity	Urban	1757.190	Urban
Post Oak Savanna: Post Oak - Redcedar Motte and Woodland	Post Oak Savanna	1.705	Urban
Barren	Agriculture	0.598	Urban
Post Oak Savanna: Live Oak Motte and Woodland	Post Oak Savanna	0.282	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.854	Urban
Native Invasive: Deciduous Woodland	Disturbed Prairie	0.011	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.994	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.078	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.039	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.016	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.089	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.063	Urban
Gulf Coast: Coastal Prairie	Coastal Grassland	0.029	Urban
Barren	Agriculture	2.751	Urban
Barren	Agriculture	0.126	Urban
Barren	Agriculture	0.646	Urban
Pineywoods: Disturbance or Tame Grassland	Disturbed Prairie	0.018	Open Water
Pineywoods: Disturbance or Tame Grassland	Disturbed Prairie	0.769	Riparian
Open Water	Riparian	0.007	Open Water
Open Water	Riparian	0.468	Urban
Open Water	Riparian	1.273	Riparian
Pineywoods: Disturbance or Tame Grassland	Disturbed Prairie	0.741	Open Water
Open Water	Riparian	0.633	Riparian
Open Water	Riparian	0.108	Open Water
Open Water	Riparian	0.546	Open Water
Open Water	Riparian	0.112	Open Water

EMST Changes Map and Photos



0 5,000 10,000
Feet

Legend

- Segment 1
- Segment 2
- Segment 3

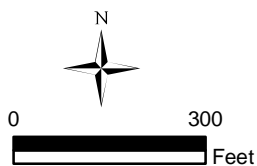
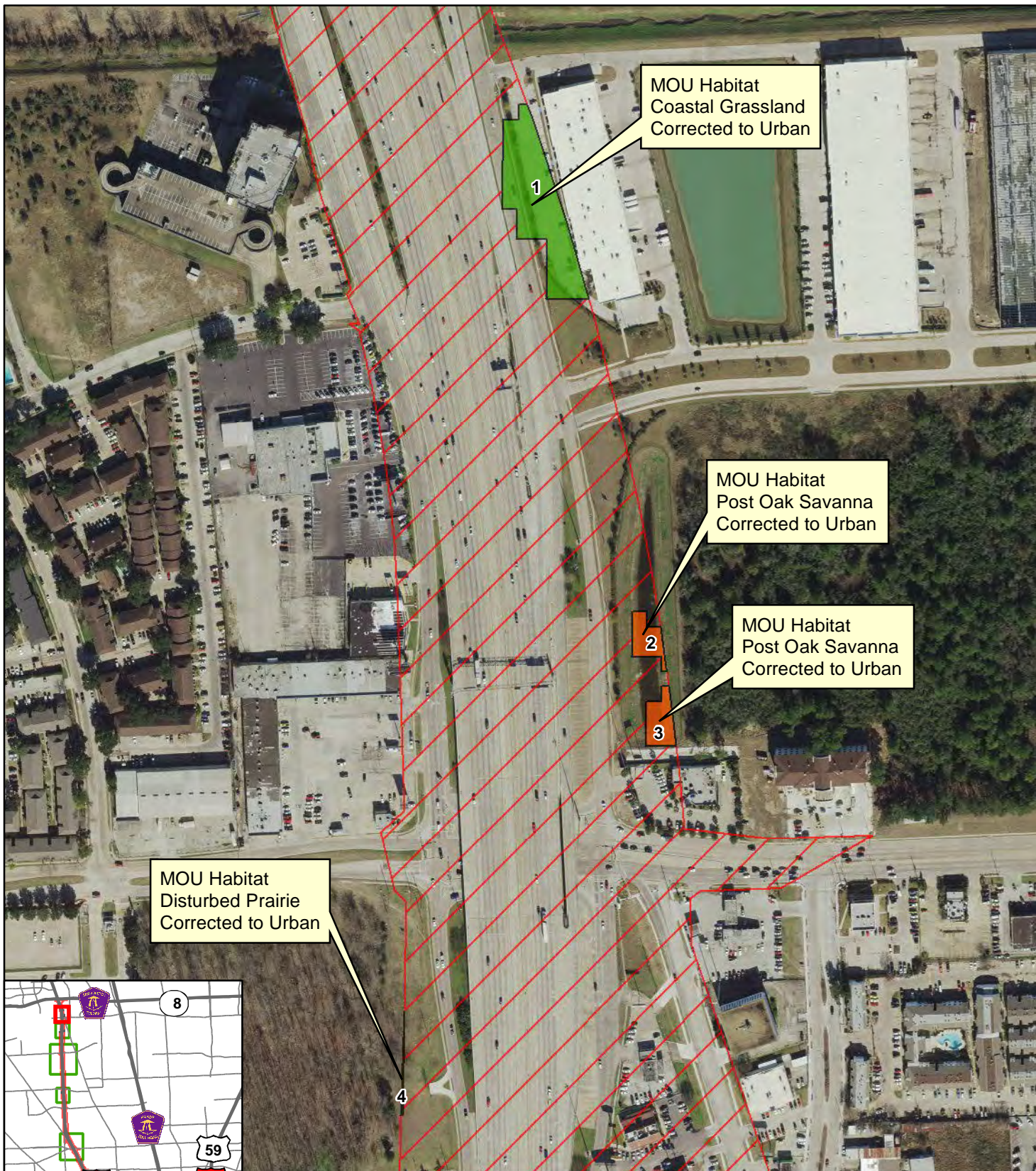
Proposed Changes to EMST Biological Evaluation Form
**North Houston
Highway Improvement Project**

Vicinity Map



Date: December 2015

Exhibit: 1



Legend

MOU Habitat Type

- Agriculture
- Coastal Grassland
- Disturbed Prairie
- Post Oak Savanna
- Riparian
- Urban

Proposed Changes to EMST Biological Evaluation Form

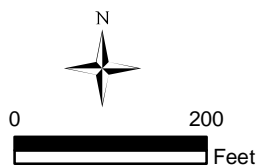
North Houston Highway Improvement Project

Site Map



Date: December 2015

Exhibit: 2 - Sheet 1



Legend

MOU Habitat Type

- Agriculture
- Coastal Grassland
- Disturbed Prairie
- Post Oak Savanna
- Riparian
- Urban

Proposed Changes to EMST Biological Evaluation Form

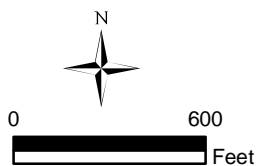
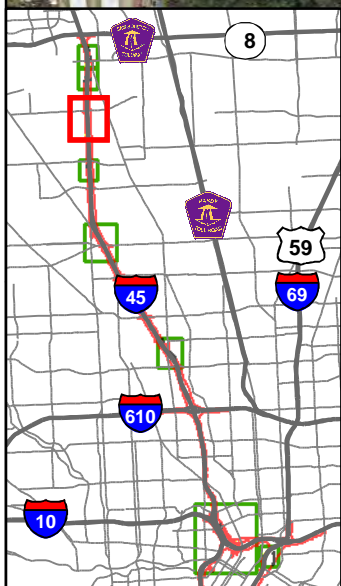
North Houston Highway Improvement Project

Site Map



Date: December 2015

Exhibit: 2 - Sheet 2



Legend

MOU Habitat Type

- Agriculture
- Coastal Grassland
- Disturbed Prairie
- Post Oak Savanna
- Riparian
- Urban

Proposed Changes to EMST Biological Evaluation Form

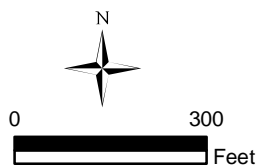
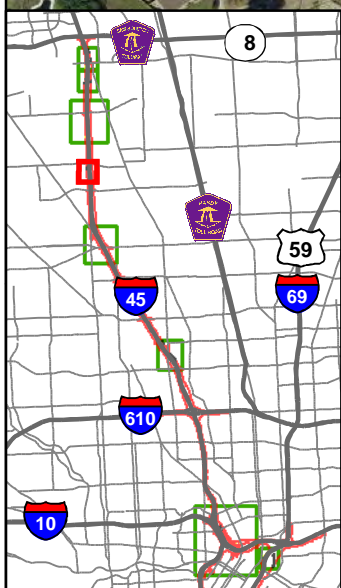
North Houston Highway Improvement Project

Site Map



Date: December 2015

Exhibit: 2 - Sheet 3



Legend

MOU Habitat Type

- Agriculture
- Coastal Grassland
- Disturbed Prairie
- Post Oak Savanna
- Riparian
- Urban

Proposed Changes to EMST Biological Evaluation Form

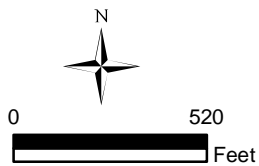
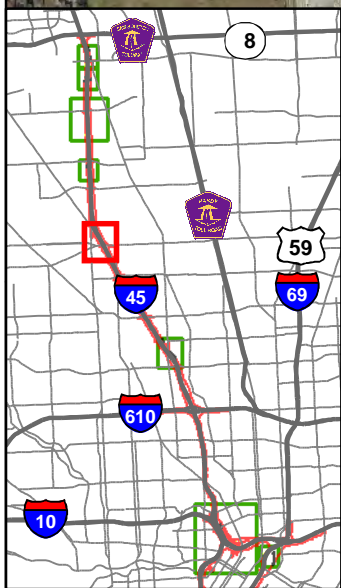
North Houston Highway Improvement Project

Site Map



Date: December 2015

Exhibit: 2 - Sheet 4



Legend

MOU Habitat Type

- Agriculture
- Coastal Grassland
- Disturbed Prairie
- Post Oak Savanna
- Riparian
- Urban

Proposed Changes to EMST Biological Evaluation Form

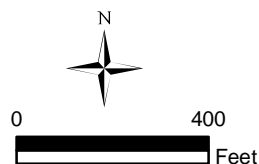
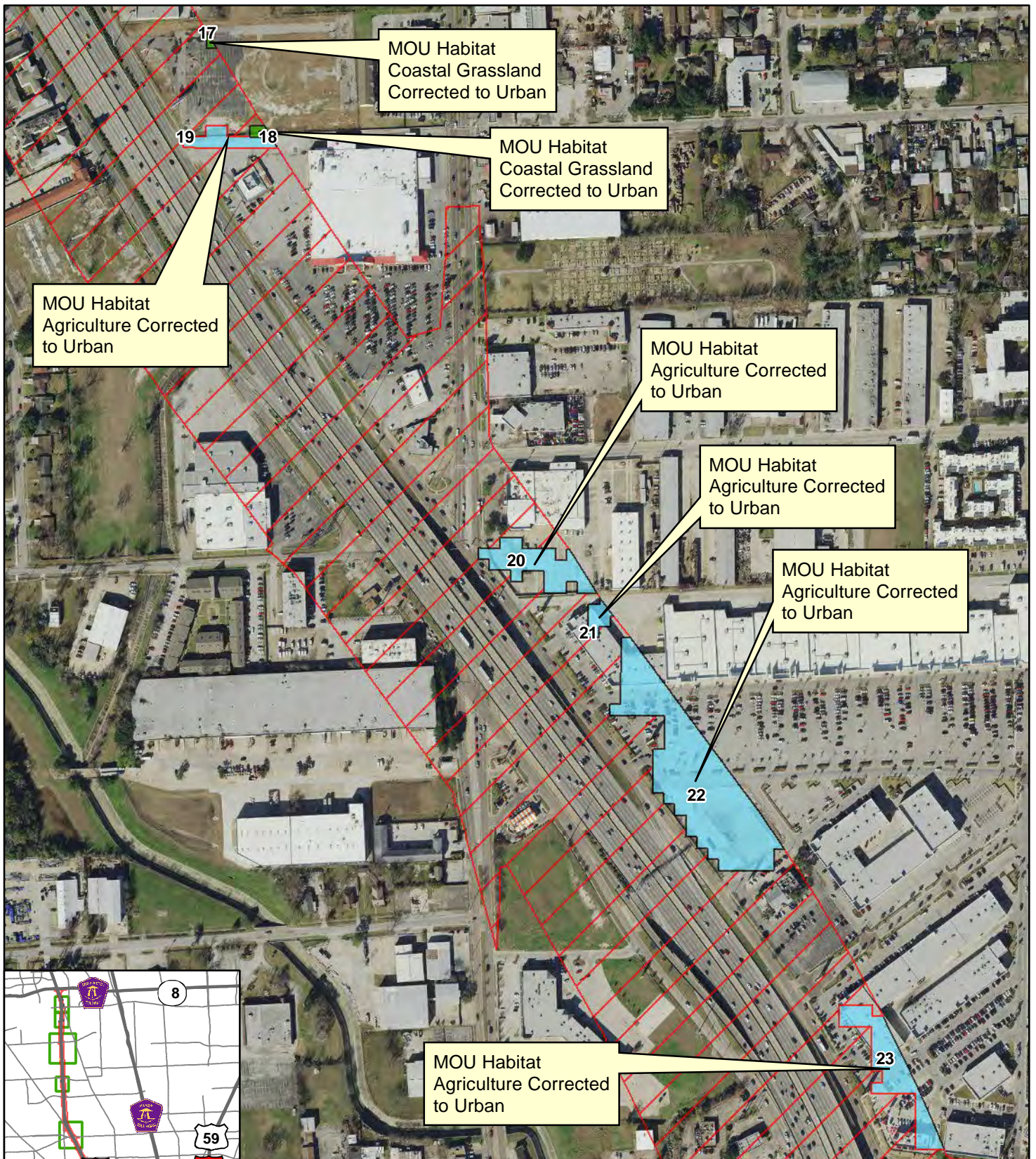
North Houston Highway Improvement Project

Site Map



Date: December 2015

Exhibit: 2 - Sheet 5



Legend

MOU Habitat Type

- Agriculture
- Coastal Grassland
- Disturbed Prairie
- Post Oak Savanna
- Riparian
- Urban

Proposed Changes to EMST Biological Evaluation Form

North Houston Highway Improvement Project

Site Map


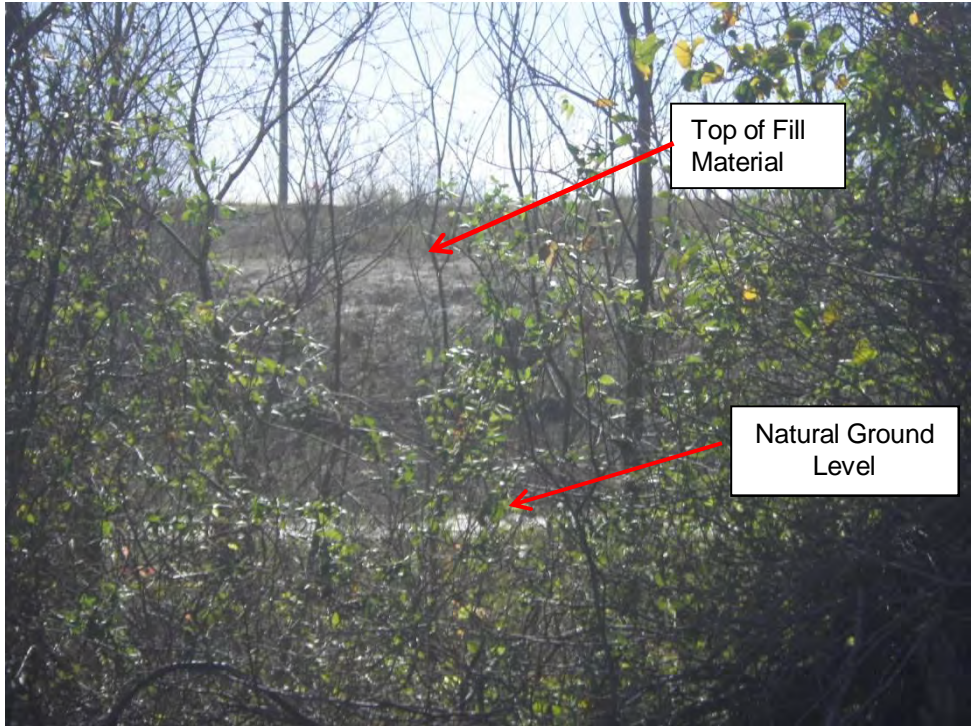


Date: December 2015

Exhibit: 2 - Sheet 6





North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 1		
Location: EMST Change Area 1		
Date: 12/17/2015		
Photo Direction: North Comments: Parking lot and buildings		
Photograph No. 2		
Location: EMST Change Areas 2 and 3		
Date: 10/15/2015		
Photo Direction: North Comments: Detention pond		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 3		
Location: EMST Change Area 4		
Date: 12/17/2015		
Photo Direction: South Comments: Maintained ROW and maintained adjacent land with planted trees.		
Photograph No. 4		
Location: EMST Change Area 5		
Date: 12/17/2015		
Photo Direction: South Comments: Note fill material in background.		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 5		
Location: EMST Change Area 6		
Date: 12/17/2015		
Photo Direction: West Comments: Parking lot and commercial buildings		
Photograph No. 6		
Location: EMST Change Area 7		
Date: 12/17/2015		
Photo Direction: South Comments: Car dealership		



North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 7		
Location: EMST Change Area 8		
Date: 12/17/2015		
Photo Direction: Southwest Comments: Parking lot and commercial buildings		
Photograph No. 8		
Location: EMST Change Area 9		
Date: 12/17/2015		
Photo Direction: North Comments: School practice field		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 9		
Location: EMST Change Area 10		
Date: 12/17/2015		
Photo Direction: South Comments: Maintained field		
Photograph No. 10		
Location: EMST Change Area 11		
Date: 12/17/2015		
Photo Direction: North Comments: Commercial buildings		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 11		
Location: EMST Change Area 12		
Date: 12/17/2015		
Photo Direction: North Comments: Maintained open field upland with shrubs and trees along fence line		
Photograph No. 12		
Location: EMST Change Area 13		
Date: 12/17/2015		
Photo Direction: Southwest Comments: Maintained open field		



North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 13		
Location: EMST Change Area 14		
Date: 12/17/2015		
Photo Direction: Northwest Comments: Parking lot and commercial buildings		
Photograph No. 14		
Location: EMST Change Area 15		
Date: 12/17/2015		
Photo Direction: East Comments: Parking lot		


North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 15		
Location: EMST Change Area 16		
Date: 12/17/2015		
Photo Direction: North Comments: Parking lot and maintained open area		
Photograph No. 16		
Location: EMST Change Area 17		
Date: 12/17/2015		
Photo Direction: East Comments: Parking lot		



North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 17		
Location: EMST Change Area 18		
Date: 12/17/2015		
Photo Direction: North Comments: Parking lot and maintained open area		
Photograph No. 18		
Location: EMST Change Area 19		
Date: 12/17/2015		
Photo Direction: East Comments: Parking lot		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 19		
Location: EMST Change Area 20		
Date: 12/17/2015		
Photo Direction: Southeast Comments: Parking lot		
Photograph No. 20		
Location: EMST Change Area 21		
Date: 12/17/2015		
Photo Direction: East Comments: Parking lot		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 21		
Location: EMST Change Area 22		
Date: 12/17/2015		
Photo Direction: Northwest Comments: Parking lot and commercial buildings		
Photograph No. 22		
Location: EMST Change Area 23		
Date: 12/17/2015		
Photo Direction: Northwest Comments: Parking lot and commercial buildings		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 23		
Location: EMST Change Area 24		
Date: 12/17/2015		
Photo Direction: North Comments: Park and maintained forested area		
Photograph No. 24		
Location: EMST Change Area 25		
Date: 12/17/2015		
Photo Direction: North Comments: Maintained banks of White Oak Bayou		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 25		
Location: EMST Change Area 26		
Date: 12/17/2015		
Photo Direction: South Comments: Maintained banks of White Oak Bayou		
Photograph No. 26		
Location: EMST Change Area 27		
Date: 12/17/2015		
Photo Direction: West Comments: Maintained open field		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
<p>Photograph No. 27</p> <p>Location: EMST Change Area 28</p> <p>Date: 12/17/2015</p> <p>Photo Direction: Northeast</p> <p>Comments: Typical of overgrown riparian area of EMST Change Areas 28 and 32</p>		
<p>Photograph No. 28</p> <p>Location: EMST Change Areas 28 and 29 taken from Area 32</p> <p>Date: 12/17/2015</p> <p>Photo Direction: North</p> <p>Comments: Buffalo Bayou northern bank and open water</p>		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
<p>Photograph No. 29</p> <p>Location: EMST Change Areas 28, 29, 30, and 31</p> <p>Date: 12/17/2015</p> <p>Photo Direction: Southwest</p> <p>Comments: Buffalo Bayou open water</p>		
<p>Photograph No. 30</p> <p>Location: EMST Change Areas 33, 34, 35, 36 and 37</p> <p>Date: 12/17/2015</p> <p>Photo Direction: South</p> <p>Comments: Maintained open field, and east bank of Buffalo Bayou and open water</p>		

North Houston Highway Improvement Project		CSJ 0912-00-146
EMST Photo Log		Site Location: Harris County
Photograph No. 31		
Location: EMST Change Area 38		
Date: 12/17/2015		
Photo Direction: Southwest Comments: Note buildings and parking lots		
Photograph No. 32		
Location: EMST Change Area 39		
Date: 12/17/2015		
Photo Direction: North Comments: Intersection of McKinney Street and Bagby Street		

This report was written on behalf of the Texas Department of Transportation by



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